S. 171, DEPARTMENT OF THE ENVIRONMENT ACT

Y 4.0 74/9: S. HRG. 103-164

S. 171, Department of the Environne...

HEARING

BEFORE THE

COMMITTEE ON GOVERNMENTAL AFFAIRS UNITED STATES SENATE ONE HUNDRED THIRD CONGRESS

FIRST SESSION

ON

S. 171

TO ESTABLISH THE DEPARTMENT OF THE ENVIRONMENT, PROVIDE
FOR A BUREAU OF ENVIRONMENTAL STATISTICS AND A PRESIDEN-
TIAL COMMISSION ON IMPROVING ENVIRONMENTAL PROTECTION,
AND FOR OTHER PURPOSES

FEBRUARY 18, 1993

Printed for the use of the Committee on Governmental Affairs

OCT 21 1993

U.S. GOVERNMENT PRINTING OFFICE

65-774

WASHINGTON : 1993

For sale by the U.S. Government Printing Office
Superintendent of Documents, Congressional Sales Office, Washington, DC 20402

ISBN 0-16-041373-7

S. 171, DEPARTMENT OF THE ENVIRONMENT ACT

74/9: S. HRG. 103-164

Department of the Environne...

HEARING

BEFORE THE

COMMITTEE ON GOVERNMENTAL AFFAIRS UNITED STATES SENATE ONE HUNDRED THIRD CONGRESS

FIRST SESSION

ON

S. 171

TO ESTABLISH THE DEPARTMENT OF THE ENVIRONMENT, PROVIDE
FOR A BUREAU OF ENVIRONMENTAL STATISTICS AND A PRESIDEN-
TIAL COMMISSION ON IMPROVING ENVIRONMENTAL PROTECTION,
AND FOR OTHER PURPOSES

FEBRUARY 18, 1993

Printed for the use of the Committee on Governmental Affairs

OCT 21 1993

U.S. GOVERNMENT PRINTING OFFICE

65-774

WASHINGTON : 1993

For sale by the U.S. Government Printing Office
Superintendent of Documents, Congressional Sales Office, Washington, DC 20402
ISBN 0-16-041373-7

COMMITTEE ON GOVERNMENTAL AFFAIRS

JOHN GLENN, Ohio, *Chairman*

SAM NUNN, Georgia

CARL LEVIN, Michigan

JIM SASSER, Tennessee

DAVID PRYOR, Arkansas

JOSEPH I. LIEBERMAN, Connecticut

DANIEL K. AKAKA, Hawaii

BYRON L. DORGAN, North Dakota

WILLIAM V. ROTH, JR., Delaware

TED STEVENS, Alaska

WILLIAM S. COHEN, Maine

THAD COCHRAN, Mississippi

JOHN MCCAIN, Arizona

Leonard Weiss, *Staff Director*

Michael D. Slater, *Professional Staff Member*

Franklin G. Polk, *Minority Staff Director and Chief Counsel*

Michal Sue Prosser, *Chief Clerk*

CONTENTS

Opening statements:	Page
Senator Glenn	1
Senator Roth	5
Senator Akaka	6
Senator Lieberman	6
Senator McCain	25

WITNESSES

THURSDAY, FEBRUARY 18, 1993

Hon. Max Baucus, U.S. Senator from the State of Montana	9
Hon. James M. Jeffords, U.S. Senator from the State of Vermont.....	11
Hon. Frank R. Lautenberg, U.S. Senator from the State of New Jersey.....	14
Hon. Dave Durenberger, U.S. Senator from the State of Minnesota.....	15
Hon. John H. Chafee, U.S. Senator from the State of Rhode Island.....	16
Hon. Carol M. Browner, Administrator, Environmental Protection Agency.....	19
Douglas M. Costle, former Administrator, Environmental Protection Agency, and former Dean, Vermont Law School.....	42
Dr. Jay D. Hair, President, National Wildlife Federation.....	46
Dr. Stephen J. Gage, President, Cleveland Advanced Manufacturing Program	47

ALPHABETICAL LIST OF WITNESSES

Baucus, Hon. Max:	
Testimony	9
Browner, Hon. Carol M.:	
Testimony	19
Prepared statement	94
Chafee, Hon. John H.:	
Testimony	16
Prepared statement	18
Costle, Douglas M.:	
Testimony	42
Prepared statement	96
Durenberger, Hon. Dave:	
Testimony	15
Gage, Dr. Stephen J.:	
Testimony	47
Prepared statement	253
Hair, Dr. Jay D.:	
Testimony	46
Prepared statement	252
Jeffords, Hon. James M.:	
Testimony	11
Prepared statement	12
Lautenberg, Hon. Frank R.:	
Testimony	14

IV

APPENDIX

	Page
S. 171	57
Prepared statements of witnesses in order of appearance.....	94
Letter with enclosure dated February 12, 1993 to Senator Glenn and signed by Russell E. Train, William D. Ruckelshaus, Lee M. Thomas, Douglas M. Costle, and William K. Reilly	101
Environmental Research and Development—Strengthening the Federal Infra- structure	103
Choosing a Sustainable Future	241
Letter dated Feb. 17, 1993 to Senator Glenn from Roger E. McManus, Center for Marine Conservation.....	258
Prepared Statement of Laurie A. Westley, National School Boards Association	260
Prepared Statement of Richard L. Hembra, GAO.....	261
Prepared Statement of Amoco Corporation.....	264
Prepared Statement of Kenneth Olden, Ph.D., National Institute of Environ- mental Health Sciences	269
Prepared Statement of Chemical Manufacturers Association	270
Questions and Answers for the Record.....	272
Answers to Written Questions Submitted by Senator Glenn.....	274

S. 171, DEPARTMENT OF THE ENVIRONMENT ACT

THURSDAY, FEBRUARY 18, 1993

U.S. SENATE,
COMMITTEE ON GOVERNMENTAL AFFAIRS,
Washington, DC.

The Committee met, pursuant to notice, at 9:40 a.m., in room SD-342, Dirksen Senate Office Building, Hon. John Glenn, Chairman of the Committee, presiding.

Present: Senators Glenn, Levin, Lieberman, Akaka, Roth, Cochran and McCain.

OPENING STATEMENT OF SENATOR GLENN

Chairman GLENN. The hearing will be in order.

Good morning and welcome to today's hearing on making EPA a Cabinet-level department. Our bill to accomplish this, S. 171, was introduced on January 21st of this year and has been referred to this Committee, and it currently has 25 Senate cosponsors.

S. 171 would elevate the Environmental Protection Agency to Cabinet-level status. In addition, it would establish a bureau of environmental statistics to compile, analyze and publish a comprehensive set of environmental quality statistics and prepare an annual report.

I would add that one of the things we looked at was that whatever your bent is on things dealing with the environment, you can find some set of statistics from some group to back up whatever it is you want to do. I would just say that without any qualification, because we had examples of that when we had the Clean Air Act on the floor.

What we would like to see this Bureau of Environmental Statistics evolve into over a period of time is a group to analyze all of these different statistics and come up with what we can better rely upon. It would be akin to the Bureau of Labor Statistics, which was established to do the same thing, to make one set of figures that we all can play from.

The bill also would also set up a Commission on Improving Environmental Protection to enhance and strengthen the management of existing programs within the department. Finally, the bill calls for the establishment of an international greenhouse gas monitoring program and an international energy conference on energy efficiency and renewable energy.

Since the advent of the atomic age and even before, the levels and types of pollutants in our air, water, and land have dramatical-

ly increased. Tragically, my own State of Ohio is a microcosm of many of these problems, all the way from radioactive hazards at the Fernald facility, part of our nuclear weapons facility, to toxic waste sites in Newburgh Heights, Uniontown, and on and on and on. In many other States, the damage we have done is equally severe. For decades, most of these problems went unnoticed or were purposely unaddressed.

We are paying the price now and it is a very high one, indeed. It includes cleanup of DOE Weapons Complex sites, which once was estimated to cost about \$110 billion—well, actually, first it started out about \$6 billion, then started escalating with every new estimate we got. But it was up to \$110 billion; it is now estimated to be at least \$160 billion over a 20- to 30-year period and may well go to over \$200 billion during that same period of time.

The General Accounting Office estimates in a report released last month to our Committee that American industry and Government combined will spend over \$160 billion per year by the year 2000 just to meet environmental goals.

GAO also estimates that we have spent over \$1 trillion, "t," trillion, on environmental protection in the past 20 years.

But these problems are not just domestic. They extend to the international arena, as well. The emissions of carbon dioxide and other greenhouse gases are believed to be major contributors to the global warming phenomenon that has potential to cause severe world-wide environmental and economic disruption during the next half century.

Over this same time period, destruction of the earth's very thin stratospheric ozone layer by chemical emissions poses potentially serious problems affecting the earth's food supplies and the health of hundreds of millions of people. This creation of ozone smog from deteriorating forests and the fall of acid rain, desertification, ocean pollution, trafficking of hazardous wastes are all issues affecting the global commons that require international agreements to achieve long-term progress.

The United States must provide aggressive leadership towards solutions to these problems. In point of fact, Vice President Al Gore has written extensively and well on this subject, including his book, "Earth in the Balance."

The Environmental Protection Agency is our Nation's primary institutional safeguard to ensure that the air we breathe, the water we drink, and the wastes we dispose of are not harmful to our quality of life. Since EPA was created in 1970, its workload has grown in proportion to the burgeoning environmental problems and often complex Federal laws to address them. However, it has become painfully apparent that the status of EPA does not reflect the magnitude of the environmental challenges it now faces.

It is a fact of diplomatic life, for example, that the seriousness with which one views another government's concerns is influenced by the stature of the person who articulates them. A subcabinet EPA sends the wrong signal to the rest of the world about the priority and the leadership given by the United States to the cause of environmental protection. This problem has been underscored repeatedly in the past by the United States' failure to send Cabinet-level representatives to international meetings.

In fact, I remember talking to one of the previous heads of EPA about an international meeting he had just come back from. He was the only person that was not of ministerial or cabinet rank at that meeting of the major nations in the world that were participating. I think, if for no other reason than that, it is worthy to elevate EPA to Cabinet status.

Let me also add, finally, that when the question of elevating the Veterans Administration to Cabinet level status came up several years ago before this Committee, we discovered there were no criteria by which to determine whether an agency should be given Cabinet status. Accordingly, the Governmental Affairs Committee contracted with NAPA, the National Academy of Public Administration, to do a study of this and it developed a set of such criteria. Without going through all of them today, I would say that NAPA reported to us that EPA meets far over a majority of the 14 criteria that it established.

I am very pleased today that we have as our first witness—after our Senate colleagues who wish to testify on this arrive and have given their testimony—Carol Browner, the new Administrator of the Environmental Protection Agency.

Carol is an able and excellent choice for this post. I must say I do not envy her the task ahead. Carol worked for Senator Lawton Chiles, who is a distinguished former member of this Committee. She worked for Senator Gore and has most recently been the Secretary for Environmental Regulation for the State of Florida. So she comes with first-hand experience dealing with some of these problems at a State level.

Our second panel includes Jay Hair, President of the National Wildlife Federation; Steve Gage, President of the Cleveland Advanced Manufacturing Program; and Doug Costle, no stranger to this Committee as a former Administrator of the Environmental Protection Agency. They will discuss some of the pressing environmental policy questions related to this proposed elevation. So we welcome these witnesses and appreciate their testimony this morning.

As I said, I think we have six colleagues that will be along shortly. Representative Mike Synar wanted to be here today and give testimony. He has worked in these areas for many years. But he will not be able to be with us this morning. We welcome his testimony, though. If he wishes to submit it, we would be glad to include it in the record.

I welcome all of you and express my appreciation for your interest and involvement in this very important question.

PREPARED STATEMENT OF SENATOR GLENN

Good morning and welcome to today's hearing on making EPA a cabinet-level department. Our bill to accomplish this, S. 171, was introduced on January 21, 1993 and has been referred to this Committee. It currently has 25 cosponsors.

S.171 would elevate the Environmental Protection Agency to cabinet level status. In addition, it would establish a bureau of environmental statistics to compile, analyze, and publish a comprehensive set of environmental quality statistics and prepare an annual report. The bill also would set up a Commission on Improving Environmental Protection to enhance and strengthen the management of existing programs within the department. Finally, the bill calls for the establishment of an international greenhouse gas monitoring program and an international energy conference on energy efficiency and renewable energy.

Since the advent of the atomic age and even before, the levels and types of pollutants in our air, water and land have dramatically increased. Tragically, my own state of Ohio is a microcosm of many of these problems, from radioactive hazards at the Fernald facility and low-level radwaste problems elsewhere in the state, to toxic waste sites in Newburgh Heights, Uniontown, and on and on. In many other states, the damage we have done is equally severe. For decades most of these problems went unnoticed or were purposely unaddressed. We are paying the price now and it is a very high one indeed:

- Cleanup of DOE Weapons Complex sites, which once was estimated to cost about \$110 billion, is now estimated to be at least \$160 billion over a 20-30 year period and may go to well over \$200 billion.
- The General Accounting Office (GAO) estimates in a report released last month to our Committee that American industry and government combined will spend over \$160 billion per year by the year 2000 to meet environmental goals.
- GAO also estimates that we have spent over \$1 trillion on environmental protection in the past twenty years.

But these problems are not just domestic. They extend to the international arena as well. The emissions of carbon dioxide and other "greenhouse" gasses are believed to be major contributors to the global warming phenomenon that has potential to cause severe worldwide environmental and economic disruption during the next half century. Over this same time period, destruction of the earth's very thin stratospheric ozone layer by chemical emissions poses potentially serious problems affecting the Earth's food supplies and the health of millions of people. This creation of ozone smog from deteriorating forests, the fall of acid rain, desertification, ocean pollution and trafficking of hazardous wastes are all issues affecting the global commons that require international agreements to achieve long term progress. The United States must provide aggressive leadership toward solutions to these problems. In point of fact Vice President Al Gore has written extensively and well on this subject, including in his book, *Earth in the Balance*.

The Environmental Protection Agency is our Nation's primary institutional safeguard to ensure that the air we breathe, the water we drink, and the wastes we dispose of are not harmful to our quality of life. Since EPA was created in 1970 its workload has grown in proportion to the burgeoning environmental problems and often complex Federal laws to address them. However, it has become painfully apparent that the status of EPA does not reflect the magnitude of the environmental challenges it now faces.

It is a fact of diplomatic life, for example, that the seriousness with which one views another government's concerns is influenced by the stature of the person who articulates them. A subcabinet EPA sends the wrong signal to the rest of the world about the priority and the leadership given by the United States to the cause of environmental protection. This problem has been underscored repeatedly in the past by the United States' failure to send cabinet-level representatives to international meetings.

Let me also add, finally, that when the question of elevating the Veterans Administration to cabinet level status came up several years ago, we discovered that there were no criteria by which to determine whether an agency should be given Cabinet status. Accordingly, the Governmental Affairs Committee contracted with the National Academy of Public Administration, NAPA, to develop such criteria. NAPA reported to us that EPA meets well over a majority of the 14 criteria it established.

I am very pleased today that we have as our first witness Carol Browner, the new Administrator of the Environmental Protection Agency. Carol is an able and excellent choice for this post, although I must say that I do not envy her the task ahead. Carol worked for Senator Lawton Chiles, a distinguished former member of this Committee. She also worked for Senator Gore and has most recently been the Secretary for Environmental Regulation for the State of Florida. Our second panel includes Jay Hair, President of the National Wildlife Federation, Steve Gage, President of the Cleveland Advanced Manufacturing Program, and Douglas Costle, former Administrator of the Environmental Protection Agency. They will discuss some of the pressing environmental policy questions related to the elevation. I welcome these witnesses and appreciate their testimony this morning.

Leading off this morning are a number of my colleagues from the Senate. Rep. Mike Synar wanted to be here today but has been unexpectedly detained with other business in the House. I want to welcome all of you and express my appreciation for your interest and involvement in this very important question. Senators Baucus and Chafee if you would like to go first and then the rest.

Senator Roth?

OPENING STATEMENT OF SENATOR ROTH

Senator ROTH. Mr. Chairman, I am very pleased that you have scheduled hearings today on legislation to elevate EPA to Cabinet-level status. As you know, I have long supported this Committee's efforts under your leadership to elevate the EPA.

I am also very pleased to see that Ms. Carol Browner, the new EPA Administrator, is here today. I have had an opportunity to meet and discuss her plans for managing that agency and I am particularly impressed by her insistence on applying performance standards on upgrading the objectivity of the agency's scientific evaluations and on improving the integrity of EPA's work product. I would hope that as this legislation takes shape no provisions are included which would hamper such efforts.

Mr. Chairman, the issue before us to decide is not whether to elevate the EPA but how to elevate the EPA. I do not believe there is any opposition in this Committee to the goal. However, you and I have marched down the road several times before in our joint efforts to elevate the EPA. This morning we try one more time. And let me suggest that this time we travel a little lighter so that we can travel somewhat further.

S. 171 contains several provisions that are extraneous to the goal of elevating EPA. It is true that I have not opposed these extraneous bureaus, commission studies, and conferences before, although these were of some concern to me. But on reflection I have come to the conclusion that any extraneous amendments, even harmless ones, lead to other extraneous amendments and so on. Then, weighted down, the bill does not achieve enactment. This happened in our last Congress. I fear it will happen again. There are all sorts of amendments in waiting. It does not take a lot of controversy to sink our efforts, as we have seen before.

Therefore, I respectfully suggest that we initiate a clean bill strategy, a strategy limited only to elevating the EPA, and that we all band together to resist any amendments. For example, the President has asked Congress to repeal the Council of Environmental Quality. I concur. But I would urge that we not load up the EPA elevation bill, even with a good amendment such as that. I am apprehensive that unless the Senate sends a clean bill to the House, the House will respond with controversial amendments which will bog us down.

The strategy I offer is friendly advice. If it is the will of the Senate that we make this into a free-for-all, I will not block S. 171, but rather reserve my rights to join in and offer my own amendments. I think I have some good ideas, too.

But, in closing, let me point out that EPA along with every Executive Branch agency is under a Presidential order to pare down its staff and its budget. Extraneous provisions of S. 171 do cost money. A proposed international conference on energy and environment costs \$5 million. The proposed Bureau of Environmental Statistics costs \$5.4 million after the second year. The proposed study of data collection practices and grants to the States costs \$250,000. The proposed commission to study our environmental laws costs \$8 mil-

lion over two years. In contrast, it costs \$30,000 a year to elevate EPA.

If the Chairman of the EPA had already achieved Cabinet-level status, I doubt that Ms. Browner would be here today to request enactment of these extraneous provisions, nor do I believe that these provisions win votes for us on the Senate Floor. As I said before, I believe that these provisions only make the journey a lot more difficult.

Therefore, Mr. Chairman, I would hope that you would join me in pursuing a clean bill strategy.

Thank you.

Chairman GLENN. Thank you.

Under our early bird order, Senator Akaka and then Senator Lieberman. If they have statements, we hope we can keep them short because we want to get to our witnesses.

OPENING STATEMENT OF SENATOR AKAKA

Senator AKAKA. Thank you very much, Mr. Chairman.

I am pleased to be a cosponsor of your bill granting Cabinet status to EPA. We are now at a point where the question is not whether we should have it. It is a question of when. This could not have happened at a more opportune time, considering the new Administration's commitment to the environment both at home and abroad.

Mr. Chairman, elevating EPA to Cabinet status has been an issue thoroughly debated in previous Congresses. While there may be differences on approaches to this issue, it is abundantly clear that this legislation is necessary if we are to safeguard and preserve our Nation's fragile environment. From clean air and clean water programs to global climate protection and a clean-up of hazardous wastes, our Nation must have a Cabinet-level department to effectively coordinate these issues among the various Federal departments and agencies who may have overlapping jurisdiction.

As most of us realize, America's environmental agenda should not be limited to our own borders. The interdependency of nations in the world economy has led to inevitable and shared concerns over the environment. This was evident at last year's Earth Summit, and it is evident in ongoing trade agreements such as the North American Free Trade Agreement.

The elevation of EPA to Cabinet status will enable America to provide the necessary leadership in the world community on environmental issues. I look forward to the enactment of this important legislation and I look forward to working with the Clinton Administration in effectuating a strong and coordinated national environmental policy.

Thank you very much.

Chairman GLENN. Thank you very much.

Senator Lieberman?

OPENING STATEMENT OF SENATOR LIEBERMAN

Senator LIEBERMAN. Thank you, Mr. Chairman.

I am glad to be here to support the bill and would like to just make a few brief comments and submit a statement for the record.

Chairman GLENN. The statement will be included.

Senator LIEBERMAN. Thank you, Mr. Chairman.

In some sense this bill runs against the flow of what is happening in Washington now where there is an awful lot of talk about reinventing Government and doing away with Government agencies, but I think the counterflow represented by this bill is quite appropriate, because in the other cases, we are really talking about eliminating form where the substance no longer exists.

This is the happy case where form follows substance, where the substance of the importance of environmental protection to our country, to our Government, has been established, but the form, the status of the Cabinet, is not there, and the presence at the table is not there in the fullest sense. Clearly, one of the intentions of this bill is to make sure that environmental protection goals and values be integrated into policy-making throughout our Government. So I strongly support the bill.

Having said that, I do want to respectfully respond to the question about whether this should be a clean bill or not, and I do it in the spirit of healthy debate, I hope. As I look at this bill, it is, respectfully, not a clean bill now.

In other words, it does not just elevate EPA to Cabinet status. It creates a Bureau of Environmental Statistics, which I support. It calls for a study by the National Academy of Sciences on the adequacy of data collection procedures, which I support. Title II authorizes the convening of an international meeting on energy efficiency and renewable energy. It encourages the establishment of an Office of UNEP, U.N. Environmental Programs, to monitor annual carbon dioxide and other greenhouse gas emissions. Title III creates a Commission on Improving Environmental Protection.

All of these, I think, are worthy steps, and I just want to state, obviously without the intention of hampering the future of the bill, that we are here present at the creation of a new department and as such we have opportunity to create in the form some of the substance that we want to see occur.

I have three particular areas that I would be interested in having considered by the Committee of my colleagues in the Senate to express what I think are some generally accepted goals that we all have about environmental protection. The first would be to create—and I have been working with Senator Mikulski and my colleague from New Jersey is at the table, Senator Lautenberg—to create within the new Cabinet-level Department of EPA an institute that would coordinate the development of environmental technologies by our Government which are critical both to our environmental and economic future, would coordinate research within that institute and would also coordinate research under a program, authorized in a bill that I have already submitted, by other Governmental agencies to make sure that we in America are at the forefront of the development of environmental technology.

Second, there is now within EPA an unofficial office of small business ombudsman. The whole relationship of environmental regulation to the small business community has too often been adversarial. We need their cooperation. We need an emphasis on pollution prevention, and I would like to see us take that small business

ombudsman office, give it legal status, and move it right under the Secretary of EPA to stress the importance of that program.

Finally, and I suppose this could fall easily under that commission to study environmental laws, I am impressed by the recommendation of the National Commission on the Environment, which was a distinguished bipartisan group headed by the former EPA Administrator, Russell Train, which called on the department in its new status to formulate a national environmental strategy, a way to bolster the process of stating what our goals are here, integrating the various departments of our Government in those goals, and in having a standard by which we can measure our progress or lack of progress.

So I think we have an extraordinary opportunity here not just to create the form that mirrors the substance, but to give it additional substance which will put our country at the forefront of environmental protection and economic development. I hope we do not lose the opportunity to do that.

Thank you, Mr. Chairman.

PREPARED STATEMENT OF SENATOR LIEBERMAN

Mr. Chairman, members of the Committee, we urgently need to place the environment at the center of the Nation's agenda. I believe the Department of the Environment Act will help us do that. I am pleased to join as an original co-sponsor of the bill, and I thank the Chairman for his continued leadership on the Bill.

The fundamental reason for creating such a department is that the environment has become a strategic issue that demands a coordinated response at the highest level of government. As Vice President Al Gore and others have compellingly argued, at stake are not only the health of this nation's lakes, rivers, forests, and wetlands, and the quality of life for our citizens, but the ecological integrity of the planet. Problems like global warming and the loss of biodiversity have brought the environment to the top of the international agenda. Domestically, a variety of local and regional problems, including urban ozone and unacceptable lead levels in children, persist in threatening our environment and our health. These problems are not simple. Solving them will require political leadership and clear plans of action.

These plans must integrate environmental protection objectives with other national objectives. Environmental protection is inexorably linked with the economy. Over the long term, a healthy economy depends on a productive workforce and a healthy environment. Environmental regulation has returned major economic benefits through, for example, reducing health care costs, and has spurred a strong domestic pollution control industry.

The strategic challenge we now face is to pursue policies that promote both economic development and environmental protection. To accomplish this, the new Department will need to employ an array of new policy tools that complement the traditional command and control environmental regulatory scheme. For example, the Department must further pollution prevention, and strengthen the economic incentives for reducing pollution. It should also assume a new role in promoting the development and widespread use of environmentally clean technologies.

The new Department will also need to work effectively with other parts of the Federal Government. Policies of other departments rarely have environmental protection as a primary goal, but often have an important effect on the quality of our land, sea, and air. Transportation and energy policy, for example, will be central to any strategy for reducing greenhouse gas emissions. Agricultural policy will continue to have a far reaching effect on water quality. In recent years EPA has made strides in working with other Federal institutions to address environmental concerns, but it has only cracked the tip of the iceberg. Elevating EPA to a Cabinet department will foster critical policy integration.

Hence, the EPA has before it the challenges of shaping policies that benefit both the environment and the economy, and of moving environmental considerations into the forefront of policy decisions throughout the U.S. government. The Cabinet bill can help jump-start this effort. But the bill could be strengthened in this regard. I am considering three amendments all of which seek to improve both the competitiveness of U.S. industry and further environmental protection.

First, I believe we should amend the Cabinet bill to establish a national environmental technologies program.

The new Administration is committed to making the United States a leader not only in environmental protection, but also in the development and commercialization of clean technologies. Developing clean technologies will play an important part in ensuring that we are economically competitive. If American companies are going to succeed in international competition, they are going to have to accelerate their productivity rate, and environmentally sound production is crucial to that process.

While our major competitors, Japan and Germany, have fostered the development of new environmental technologies through active involvement with all stages of research, development and commercialization, the United States does not have a coherent national policy to encourage the development of environmental technology. This legislation presents the perfect opportunity for setting forth our national policy.

I have introduced legislation to promote environmental technology innovation and commercialization. It is modeled on the Small Business Innovation and Research Act—a program that the General Accounting Office has found to be an extremely successful mechanism for helping small businesses move new products into the marketplace. My legislation would direct a small percentage of Federal agencies' R&D and environmental cleanup funds toward environmental technology development and commercialization. I am currently working with Senator Mikulski, who has also introduced environmental technology legislation, to combine our legislation into an amendment to the Cabinet bill.

The second amendment would strengthen EPA's role in providing environmental assistance to small business. Small businesses have an important role to play in both the economy and the environment. They contribute significantly to job creation, but they also contribute to our environmental problems such as ground-level ozone and urban runoff. Small businesses face obstacles in identifying and adopting cost-effective environmental strategies. The current web of regulations and the adversarial relationship between business and government create barriers to holistic, pollution prevention approaches. It is time to move toward more of a partnership with small business by expanding pollution prevention and compliance assistance programs. I am drafting an amendment that would elevate the Small Business Ombudsman Office within EPA to an office directly under the Administrator and provide a clear legislative mandate for the office. The amendment would also expand other pollution prevention and compliance assistance programs for small businesses.

Finally, my third amendment to the Cabinet bill would direct the Administration to develop a national environmental strategy. As the U.S. has stated repeatedly in international fora, national environmental strategies are valuable tools for integrating environmental concerns into all areas of government decisionmaking. The National Commission on the Environment, a bipartisan, distinguished Commission headed by former EPA Administrator Russell Train, also noted the benefits of national strategies and recommended in its recent report that Congress direct the Administration to develop a national environmental strategy in conjunction with EPA elevation. I believe such a strategy has several important benefits. In addition to helping integrate environmental and economic policies, a national commitment to clear, measurable environmental goals would improve government accountability and would help steer private as well as public sector environmental protection efforts. Building a consensus on the Nation's environmental objectives among government departments and agencies, the Congress, and the public will require White House and congressional leadership.

I look forward to working with the Chairman and members of this Committee, with my colleagues on the Environment and Public Works Committee, and with the Administration to advance this bill and to consider these amendments.

Chairman GLENN. Thank you very much.

We are glad to welcome some of our Senate colleagues here today. They wanted to testify on this and we are glad to welcome them for their testimony in the order in which they arrived this morning.

Senator Baucus, if you would lead off?

TESTIMONY OF HON. MAX BAUCUS, U.S. SENATOR FROM THE STATE OF MONTANA

Senator BAUCUS. Thank you very much, Mr. Chairman.

It is a pleasure to be here this morning to speak in support of S. 171, a bill to elevate the Environmental Protection Agency to a Cabinet department. I know that for the past several years, Mr. Chairman, you have been working very hard yourself to make EPA a Cabinet-level department. I appreciate your efforts, I applaud your efforts, and I want to work closely with you and with the new Administration to see that this legislation becomes law as quickly as possible.

Mr. Chairman, as you know, the Environmental Protection Agency was created by Executive Order in 1970 to respond to decades of environmental neglect. In the 23 years that have passed the EPA has made considerable progress. But as we approach the 21st Century it is clear that we need to be better organized to meet today's environmental problems.

Today, environmental issues are global in scale and intertwined with other domestic and international issues. One of the first steps we can take is to establish a new Cabinet-level Department of Environmental Protection capable of advancing our environmental ethic on a broad front. It is increasingly clear that environmental policy must be made an integral part of everyday decisions throughout Government and business. Trade and tax policies, investment decisions, energy programs all have environmental components.

I am pleased this Administration will place an emphasis on environmental protection, but if we expect environmental protection to in truth be a priority, if we expect to fully integrate environmental policy into all of our decisions, and if we expect our environmental agency to compete fairly with other Cabinet departments for scarce resources, then we must insure it is on an equal footing.

Furthermore, environmental policies can no longer be made in global isolation. We now must consider the international dimensions of environmental problems, like the thinning of the ozone layer, greenhouse gas emissions, deforestation, and the environmental dimensions of international trade through NAFTA or through GATT.

Elevating the Environmental Protection Agency to a Cabinet department is an important first step in earning greater respect from the international community. As you know, most of our global competitors, including our major trading partners, give their environmental agencies full Cabinet status. But because we do not, the United States often is put in an awkward position. Our sub-Cabinet environmental officials have frequently been at a disadvantage when negotiating treaties and policies with Cabinet-level ministers from other nations. It sends a signal to the international community that we do not attach as great importance to environmental protection as do other countries.

These concerns were echoed by former EPA Administrator Bill Reilly last Congress, before your Committee, when he stated, "The perception of the United States Environmental Protection Agency as not headed by a Cabinet officer I think strikes many other governments as odd, anomalous, and difficult to understand, particularly now as we have these interactions on such fundamental, important issues."

That comment struck home to me just last year. Senator Chafee and I and others, including the Vice President, were among participants at the Earth Summit in Rio. We learned first-hand what other countries thought of our commitment to environmental protection and, frankly, they did not see us as leaders. In some cases, they saw us as worse than followers.

Now, simply elevating EPA to Cabinet status obviously will not cure those ills, but having a Secretary of Environmental Protection in Rio certainly would not have hurt us, and I believe it even might have helped. If we expect to be world leaders on environmental policies, our negotiators must be able to deal with other countries on an equal footing. Establishing a Cabinet Department of Environmental Protection I think will do that.

Mr. Chairman, the legislation is critical. It is necessary, long overdue, and should be enacted. I stand ready to work with you to see that it is enacted as quickly as possible.

Thank you.

Chairman GLENN. Thank you very much, Senator Baucus.
Senator Jeffords.

TESTIMONY OF HON. JAMES M. JEFFORDS, U.S. SENATOR FROM THE STATE OF VERMONT

Senator JEFFORDS. Thank you, Mr. Chairman.

I also want to commend you for your diligence in attempting to get this legislation through. I strongly support this bill and applaud the Committee for taking it up again, and I know this has not been an easy task. I certainly would like to say I support the comments made by the Chairman of the Environment Committee and endorse them.

In spite of the fact that this bill is in the purview of your Committee, I appreciate the jurisdictional concerns that made your task rather difficult. I have a number of comments which I will mostly submit for the record, in the interests of time. My comments are not meant to make your task more difficult. These comments are meant as much for EPA as for the Committee.

First, I am concerned about the number of Level 4 presidential appointments. With the 10 assistant secretaries, I believe that the total number of such appointees comes to 12. That is roughly 1 Level 4 appointee per 1,500 employees. By contrast, the Department of Defense has roughly 1 Level 4 employee per 27,000 employees. I believe the Department of the Interior has about 20,000 employees for each Level 4 appointment. Your bill provides flexibility as to the number of appointees which I hope the Secretary of the Environment will utilize. Hopefully, the commission authorized by this bill will also help streamline the agency, such that 10 assistant secretaries will not be needed.

I recognize that nearly everyone has a position they would like to see as assistant secretary level, myself included. I would like to see the new Administrator restore the Associate Administrator for Regional Operations and State and Local Affairs to confirmed status. Our cities and towns need to know that EPA has placed their concerns at the highest level.

In addition, I believe the title of the position should be changed to include Native American governments. Some positions, such as Congressional Affairs, may not need to be confirmed at all. In my opinion, we do not need to confirm that individual. If we don't like this person, the Secretary will soon know it. Requiring confirmation could delay appointment of another individual. The International Affairs position, since the Department of State has the lead in international affairs, may not require confirmation. Perhaps the bill could be modified to not require that these functions require confirmation.

For each position not requiring confirmation we could potentially save tens of thousands of dollars in administrative salaries.

The legislative language for selecting the Director of the Bureau of Environmental Statistics may be a bit restrictive. Since we are to confirm this individual, it seems unnecessary to place requirements in the statute that the individual be familiar with statistics. Our rule in confirmation is to insure that that person is qualified. Furthermore, we have placed no similar legislative language in the statute for higher level assistant secretaries.

Last, I am concerned about the need for an annual report for the Bureau of Environmental Statistics. Trends take years to become apparent and requiring an annual report may give incentives to over-analyze the data, as well as waste money.

Mr. Chairman, I thank you for your efforts and your staff's effort in this legislation. I commend you for your work. I hope that this Congress, the House, will act on this legislation and bring years of very hard work to fruition.

PREPARED STATEMENT OF SENATOR JEFFORDS

Mr. Chairman:

Thank you for the opportunity to testify on the Department of the Environment Act. I am proud to be a cosponsor of your legislation. It is time that an agency whose mission it is to protect the environment be given the same status as an agency whose mission it is to make war.

That being said, Mr. Chairman, rather than take time repeating my support for the bill, I would like to make a few suggestions with respect to this bill. I understand that getting the bill to this point has required many delicate compromises and that making further changes may endanger swift passage of this legislation. Thus, many of my suggestions are directed as much to EPA as to the Committee. The flexibility included in this bill will permit the new Secretary to consider many of these suggestions.

First, Mr. Chairman, in these days of budget cuts and staff reductions, I am concerned about the number of assistant secretary slots. The legislation proposes ten assistant secretary's for an agency of roughly 18,400 employees. All told, I believe there would be twelve level IV presidential appointees, or approximately one level IV appointee per 1,500 employees. For comparison purpose, I estimate that the number of Presidential level IV appointees for other agencies to range from 27,300 to 118, with EPA being in the lower end of the range.

For example, the Defense Department has about 27,000 employees per level IV appointee. The Defense Department is often cited for waste, but at least in this regard, they seem to be quite efficient. Interior has about 20,000, Treasury about 12,300, Agriculture about 12,000. By contrast, the Department of Education has less than 600 employees per level IV appointee. Energy and HUD about 1,100. Perhaps, Mr. Chairman, we could streamline the Agency a bit and reduce the number of level IV appointees?

I am aware that many interest groups each want their own Assistant Administrator. Thus, I understand why ten positions have been authorized. It is my hope that the Commission authorized by this bill will help identify ways to streamline EPA and reduce the number of top level management.

Perhaps some of these positions could be handled by Presidential appointees not confirmed by the Senate. Candidate positions would include the Assistant Administrator for International Affairs, and the Associate Administrators for Congressional affairs and for public affairs. The need to confirm the individual in charge of congressional affairs seems unnecessary.

The Administrator will soon learn if an appointee is inappropriate. Requiring confirmation could delay efforts to replace an ineffective individual.

I would like to see the person selected for intergovernmental relations be a confirmed position and have suggested such to EPA Administrator Browner. Our cities and towns are struggling to comply with environmental regulations. EPA needs the highest quality individual to work both with our local governments and within the Agency to address the problems facing our communities. The title of the Associate Administrator for Regional Operations and State/Local Affairs should perhaps be amended to include our Native American governments.

I also have some suggestions for the Bureau of Environmental Statistics. My first concern is one of perception. I fear we may have higher expectations of this position than may be realistic. If one is thinking of trend analysis of rainfall, for example, then much work has been done in this area. But, in terms of pollutant monitoring, environmental statistics, as a field of study, is relatively new. It has not been too many years since the first significant text on environmental statistics was published. People with experience in environmental statistics are most likely to come from fields such as meteorology or geology. While these are environmental sciences, they are not the fields many think of when thinking of the environment. To many people, environment is synonymous with pollution.

The application of statistics to pollution monitoring is increasing, but currently, much more research is needed. For example, it can cost more to sample a hazardous waste site than it does to clean it up. Sample analyses can be very expensive reaching several thousand dollars per sample. One can remediate a lot of contaminated soil for several thousand dollars. My concern is that some may be expecting a level of data analysis that is just not possible. We should guard against false expectations about the level of analysis possible. Furthermore, given that trends may take time to become apparent, I wonder if preparation of an annual report would provide sufficient information to justify the cost. Perhaps a two-year cycle is appropriate. I know the Council of Environmental Quality did an annual report, but President Clinton has proposed abolishing this office. How many people really read CEQ's annual report? Certainly not enough to justify keeping CEQ.

Secondly, I confess some disappointment in the work accomplished by EPA's Office of Research and Development. Congress is partly to blame as much of ORD's budget gets earmarked for pork projects, not for important research. The level of research and results achieved by ORD has disappointed some to the point that they want to create a whole new Agency to fund environmental research. The Bureau of statistics is going to be very dependent upon the level of research into environmental statistics. Thus, I believe that responsibility for statistical research should be transferred to this Bureau and not be under the jurisdiction of ORD. This is a suggestion I hope the Secretary of the Environment would strongly consider.

Third, the Director of the Bureau is to be "a qualified individual with experience in the compilation and analysis of environmental statistics. I would suggest deleting this reference as it is redundant. Our role in confirming the nomination should be sufficient to ensure that the Director is qualified without placing this requirement into the statute. After all, we have placed no such requirement on the Assistant Secretaries who will have a higher level political appointment.

Last, I have some concerns about creating a Commission on Improving Environmental Protection. President Clinton has asked Departments and Agencies to trim back on the number of commissions and advisory groups. Perhaps other mechanisms than creating a commission could be used to accomplish this goal. Oversight hearings and GAO studies could answer some of these questions. Unfortunately, Mr. Chairman, I recognize the political realities that jurisdictional squabbling will make it difficult for Congress to play a significant role in restructuring EPA.

Those, Mr. Chairman, are my brief comments on this bill. I commend you on your efforts and look forward to fast action on this bill.

Chairman GLENN. Thank you very much.
Senator Lautenberg.

TESTIMONY OF HON. FRANK R. LAUTENBERG, U.S. SENATOR
FROM THE STATE OF NEW JERSEY

Senator LAUTENBERG. Thank you very much, Mr. Chairman.

I commend you for holding this hearing to review the case for elevating the Environmental Protection Agency to Cabinet status. I hope that the Committee's conclusion will be to support the bill.

I have long believed that elevating the EPA to Cabinet status would give environmental issues the priority they deserve and so desperately need in our country. That is why in 1989 Senator Durenberger and I introduced legislation to accomplish this goal. I hope that we will not have to wait much longer to achieve it.

While giving EPA Cabinet-level status is no substitute for good environmental policy, it will help give the environmental issues the focus they deserve at the Cabinet level, not only in this Administration, of course, but in every Administration that follows. It will enhance the agency's ability to protect the environment and to exert leadership to solve the tough environmental problems we face.

When EPA is a Cabinet-level agency, environmental initiatives will have the President's ears. When the hard decisions are made on the great variety of domestic and international issues that affect the environment, the Secretary of Environment will be there to lend her advice and perspective to the debate.

Further, elevating EPA to a Cabinet-level agency will demonstrate to both a domestic and a global audience that America's commitment is to protect the environment. It would send an unmistakable signal of the priority that we, as a Nation, place on preserving the environment and enhancing the public health and welfare.

Mr. Chairman, you heard Max Baucus, Chairman of the Environment and Public Works Committee, make reference to our visit to the Earth Summit with Senator Chafee and with now-Vice President Gore in attendance. It was apparent to many there that the United States' position was not the leadership position that it should have been. While elevating EPA to a Cabinet position may not have changed that position, it would have increased the influence of the Administrator to have the U.S. be more serious about leadership on environmental issues than we have been in the past.

The environmental challenges with which we must grapple over the next decade are vast. Yet, for too long, we have heard that we cannot address our environmental problems because of the adverse effect it would have on the economy. But my view is that environmental regulation is consistent with economic growth. A healthy environment is not only consistent with but essential for a prosperous, sustained-growth economy.

President Clinton and Vice President Gore understand this truth well and spoke eloquently about it during the campaign. In New Jersey, my State, highly industrialized, home of pharmaceutical and chemical and plastics companies, we already know that a clean environment and a growing economy go hand-in-hand. Our State faces some of the toughest environmental problems in the Nation and has adopted some of the most far-reaching and innovative environmental laws. And yet, until the recent recession, New Jersey

enjoyed robust economic growth and business expansion, even in those many businesses regulated by tough environmental requirements.

And a new report by MIT Professor Stephen M. Meyer confirms that over the past 2 decades, the States with the stronger environmental programs outperformed States with weaker environmental programs on all measures of economic growth.

The planet is small and our resources finite. It cannot keep on taking the pounding it is received and continue to provide the healthy, life-sustaining environment on which we depend. We owe our children and future generations a habitable earth, and we can do a better job in achieving that objective. We must.

Making EPA Cabinet-level in and of itself will not solve our environmental problems. We need more funding, tougher enforcement, and stronger leadership. I am convinced that the Clinton-Gore Administration is committed to providing this leadership and to tackling our environmental problems head-on. But I firmly believe that making EPA a Cabinet-level agency will give it the stature, the voice, and the visibility to propel the environment to the top of our National agenda and help it take its place alongside the economic issues, health care and other important items. That is a good first step down the road to a more environmentally sound tomorrow.

Mr. Chairman, once again, I commend you for taking a leadership position in moving this issue, and I hope that the Committee will report the bill expeditiously.

Chairman GLENN. Thank you, Senator Lautenberg.
Senator Durenberger.

TESTIMONY OF HON. DAVE DURENBERGER, U.S. SENATOR FROM THE STATE OF MINNESOTA

Senator DURENBERGER. Mr. Chairman, Senator Roth, along with my colleagues I am here to congratulate both of you for taking prompt action on this legislation. I know the personal effort and the commitment that both of you have made to this bill and its predecessors and also to protecting human health and our natural resources through other legislation, as well.

Elevating the environmental function to Cabinet rank is a pretty simple proposition, and there is not much new to say, so with your permission, I will use this opportunity to offer a small challenge to the new Administration.

The principal reason to make EPA a Cabinet department is to involve the President more directly in setting environmental policy. I have many times illustrated the value of Presidential involvement by citing the issue of acid rain, with which we are all very familiar.

The first bill to address the acid rain problems were introduced in the United States Senate in 1980. I was in on that launch, as I have been on this since the summer of 1988. Over the next decade, the Environment and Public Works Committee reported acid rain legislation on four occasions, without any result. Those efforts were directed by very able legislators. George Mitchell was one, Bob Stafford another.

The acid rain issue was of great importance and it captured public attention, but no legislation moved to the floor of the Senate until George Bush entered the White House. He gave the issue Presidential leadership. He gave us his own acid rain program and his commitment to get a bill enacted. The deadlock was broken, compromises were reached, and a truly ambitious acid rain control program is now under way.

Presidential involvement is the point of this bill. It is also the only hope of this bill. And there is the challenge. Cabinet status for EPA has been pending before the Congress since July of 1988. We all believe it is a good idea. There is political capital in the idea for all of us. But the capital has been frittered away on the many other issues that members have tried to attach to this engine. As so often happens in this branch of Government, a good engine is grinding to a halt by an excess of baggage.

President Clinton says he is for this bill. But if past experience is any guide, it is going to take much more than endorsement to get this train moving. It is going to take real Presidential involvement.

Last week the President recommended that the Council on Environmental Quality be abolished and replaced with a White House Office of Environmental Policy headed by a deputy assistant to the President. I ask you, is that real involvement? I would call it devolvement by President Clinton. The proposal was described as a net plus for the environment, but it is not. No economist would trade the Council of Economic Advisers for a deputy assistant to the President. No environmentalist should be happy with a comparable trade.

If EPA is at the Cabinet table as a matter of law, the loss of CEQ as a voice for the environment in the ongoing structure of Government would be much less troubling. But I have been involved with the Cabinet bill from the beginning, and I know that is a big "if."

EPA will formally join the Cabinet only if the President exercises personal leadership to move this bill. For a President to endorse the idea of the Cabinet bill without making the personal effort to move it through the Congress is to miss the whole point. There will be plenty of time to consider the future of CEQ after we have a Department of Environmental Protection.

Thank you, Mr. Chairman.

Chairman GLENN. Thank you very much.

Senator Chafee.

TESTIMONY OF HON. JOHN H. CHAFEE, U.S. SENATOR FROM THE STATE OF RHODE ISLAND

Senator CHAFEE. Thank you very much, Mr. Chairman and Senator Roth, Senator Lieberman. I am delighted you are taking up this measure.

It seems to me, Mr. Chairman, the problem before us is not whether or not there should be legislation making EPA a Cabinet post. I think we all agree on that. The question is what kind of legislation there should be. I think that is the problem before us.

I urge you to approve legislation that addresses the simple problem of converting EPA to a Cabinet department and to avoid the temptation to address other issues.

Now, why do I say that? This is the fourth Congress, fourth straight Congress, to consider legislation that would elevate EPA to Cabinet rank, and we have all been around here during this period. I can remember going down to the White House, I believe you were there, with the President. I guess it was early in President Bush's term when he said, "Let's get going on this," and there seemed to be great agreement, but problems occurred.

Now, what happened to the previous attempts? It seems to me that the stumbling block, as Senator Durenberger mentioned, has been the other issues, whether it is global warming or private property rights or Government ethics. All those were loaded onto the bill. I do not think that just because a bill passed the Senate last year that we should believe that the same bill will pass the Senate quickly this year. And even if it does pass the Senate this year, the same bill that passed last year, I think it is important to remember that that bill did not become law. The House refused to consider it.

We all want the bill to reach the President's desk, so my urging is to report a clean bill that leaves these other issues that are not directly involved with the Cabinet status to a later time. If the bill reported from this Committee is more than a simple elevation of EPA, there is clearly going to be a temptation on the Senate floor to turn it into an environmental Christmas tree.

For example, I know, as it is said sometimes, there is lying in the weeds out there an effort to attach legislation forbidding so-called takings without compensation. Now, that is an issue we have wrestled with before, but if that is on this legislation, certainly if it is attempted to be put on, that is going to bog down this legislation. There will be very strong objections to that.

So I also urge that the President be allowed maximum flexibility to organize and reorganize the priorities of the department as the needs and priorities of the Nation demand. I do not think we ought to write into law each and every office within the agency.

Now, one issue that has arisen, as Senator Durenberger mentioned, is the future of the Council on Environmental Quality, CEQ. President Clinton has suggested that it be abolished and replaced with a White House office. Now, that is going to require amendments to the Environmental Quality Improvement Act of 1970, legislation that falls under the jurisdiction of the Committee on Environment and Public Works. The proposal raises several questions that have yet to be answered. That is, the President's proposal.

In the interests of moving the EPA bill along quickly, I suggest that your Committee report a clean elevation bill and leave the CEQ issue to be dealt with by the Environment and Public Works Committee.

As a member of that Committee, as the ranking member, I pledge to work with President Clinton and with Vice President Gore on the future of CEQ. But please, let us not hold up Environmental Protection Agency Cabinet status while we work on the CEQ issue.

One final point, Mr. Chairman. I urge that the concept of protection be kept in the title of the department. I doubt that all of us here could reach a quick agreement on the meaningful missions of this new department, but surely we can agree that protecting the

environment is among the highest purposes for which this entity would be constituted. I very strongly believe that the legislation that the Senate sends forth should call the new agency the Department of Environmental Protection, not just the Department of Environment.

Twenty years ago, Mr. Chairman, we undertook a new and difficult challenge as a Nation. We knew that life and its most enriching experiences could only be sustained by careful stewardship of our natural environment, so we turned to Government to do this, principally through the laws that are now administered by EPA.

These laws have been effective. I think there is a very, very outstanding record that has been achieved by EPA. The quality of our air and water has improved. Public lands and threatened wildlife resources are being restored. Untold damage has been avoided. I might say, compared to other recent Federal Government efforts, for example the budget process or the war on drugs or the energy policy, compared to those, our laws and programs to protect the environment have been a real success.

Twenty years ago, environmental protection as a purpose of the Federal Government may have been a radical idea. Today, it is an accomplished fact. I believe we ought to continue to recognize that reality by creating the Department of Environmental Protection.

Thank you very much, Mr. Chairman.

PREPARED STATEMENT OF SENATOR CHAFEE

Mr. Chairman, Senator Roth and Members of the Committee, I am pleased that you are taking early action on legislation to make EPA a cabinet department. This is an important step.

Because elevation of EPA to cabinet status is an important step, I urge you to approve legislation that addresses the simple question of converting EPA to a cabinet department and to avoid the temptation to address other issues.

This is the fourth straight Congress to consider legislation that would elevate EPA to cabinet rank. Previous attempts have failed because too many other issues . . . global warming, private property rights, government ethics . . . were loaded on to the bill.

We should not expect that just because a bill passed the Senate last year, the same bill will pass the Senate quickly this year. And even if it could pass the Senate, it is important to remember that the bill we approved last year did not become law. The House refused to consider it.

We want this bill to reach the President's desk, so my advice is to report a clean bill that leaves to another time issues that are not directly related to cabinet status. If the bill reported by this Committee is more than a simple elevation of EPA, there will be a temptation on the Senate floor to turn it into an environmental Christmas tree.

I would also urge that the President be allowed the maximum flexibility to organize and reorganize the Department as the needs and priorities of the Nation demand. We should not write into the law each and every office within the agency.

One issue that has arisen in the past few days is the future of the Council on Environmental Quality. President Clinton has suggested that CEQ be abolished and replaced with a White House office. That would require amendments to the Environmental Quality Improvement Act of 1970, legislation that falls under the jurisdiction of the Committee on Environment and Public Works. The proposal raises several questions that have yet to be answered. In the interest of moving the EPA bill along quickly, I suggest your committee report a clean elevation bill and leave the CEQ issues to be dealt with by the Environment and Public Works Committee.

As the ranking Republican member of the Environment and Public Works Committee, I pledge to work with President Clinton and Vice President Gore on the future of CEQ. Let's not hold up EPA cabinet status while we work out the CEQ issues.

One final point, Mr. Chairman. I urge you to keep the concept of "protection" in the title of this department. I doubt that we could reach quick agreement on any

meaningful mission statement for the new department. But surely we can agree that protecting the environment is among the highest purposes for which government is constituted. I very strongly believe that the legislation you send to the Senate should call the new agency the "Department of Environmental Protection", not just the "Department of the Environment."

Twenty years ago we undertook a new and difficult challenge as a nation. We saw that life and its most enriching experiences can only be sustained by careful stewardship of our natural environment. We turned to government, principally through the laws now administered by EPA, to protect our common interest in the quality of our air, waters and lands.

These laws have been effective. The quality of our air and water has improved. Public lands and threatened wildlife resources are being restored. Untold damage has been avoided. Compared to other, recent Federal efforts . . . for instance, the budget process or the war on drugs or energy policy, our laws and programs to protect the environment have been a real success.

Twenty years ago, environmental protection as a purpose of the Federal Government may have been a radical idea. Today, it's an accomplished fact. It is time to recognize the reality by creating the Department of Environmental Protection.

Chairman GLENN. Thank you very much, and thank you all. We appreciate your testimony this morning.

Thank you.

As I indicated before, Mike Synar, Representative Synar, had hoped to be here this morning. His statement will be included in the record also. He was unable to be with us this morning because of a conflict.

Senator ROTH. Mr. Chairman, could I just thank this distinguished panel for being here, and I would like to say to Senator Durenberger and Senator Chafee, I think Senator Durenberger was the first to introduce a bill proposing raising the EPA to Cabinet status, but I strongly agree that the best chance we have of getting this legislation enacted is a clean bill. I appreciate their cosponsoring my legislation.

Senator DURENBERGER. Thank you.

Chairman GLENN. Thank you.

Our next witness this morning is the Hon. Carol Browner, recently installed Administrator of the Environmental Protection Agency.

Ms. Browner, we welcome you to the table this morning and look forward to your testimony.

TESTIMONY OF HON. CAROL M. BROWNER,¹ ADMINISTRATOR, ENVIRONMENTAL PROTECTION AGENCY

Ms. BROWNER. Thank you, Mr. Chairman and Members of the Committee.

I am honored to testify before you today in support of creating a Cabinet department on the environment and to confirm this Administration's commitment to improving environmental quality. I want to commend the leadership of this Committee, and particularly the Chairman and Senator Roth, who have demonstrated in pursuing this matter over the years.

We all share a strong commitment to the environment. However, without an adequate institutional framework, even principled commitment can be rendered abstract. The question is not whether to create a Department on the Environment, but when.

¹ The prepared statement of Ms. Browner appears on page 94.

The answer is now, at the beginning of this Nation's third decade of Federal environmental protection, a decade in which we must move from command and control, media-specific regulation to alternative approaches, including pollution prevention, ecosystem protection, and incentive-based policies. It is time for a department on the environment to function as a permanent and equal partner in the President's Cabinet, integral to any equation of Federal decision-making.

We have the opportunity now to establish an environmental infrastructure ready to meet the challenges of the 21st Century. Preventing pollution by elimination or reduction of waste at the source is key to this Administration's commitment to providing a healthy economy that meets our needs today while preserving the environment for our children and future generations.

A Cabinet department on the environment will be well-positioned to accelerate efforts to integrate pollution prevention and multi-media decision-making into regulatory and compliance programs Government-wide, to promote the use of incentive-based policies, to improve technical assistance to small businesses, and to encourage corporate commitment to clean manufacturing processes and green products. A Cabinet that includes an environment department will ensure that the environment is fully engaged and integrated into this country's examination of and decisions on all national issues.

Likewise, EPA's international environmental programs provide cooperation with and technical expertise to developing and newly democratic countries and our industrial partners. Cabinet status will be important in making the head of EPA a peer with Cabinet colleagues in foreign environment ministries and promoting international cooperation on the environment.

In the past 20 years, this country has created most of our existing environmental infrastructure and body of law. To be sure, the National debate among Federal, State, local, and tribal governments, industry, and the public on environmental matters has not always been successful. Nevertheless, significant progress has been achieved. The air, water, and land are demonstrably cleaner as a result of our joint efforts. Yet the problems grow.

In 1993, concern for the environment affects individual, corporate, and governmental behavior. The environmental ethic has evolved and is taken seriously across economic, cultural, geographic, and governmental sectors. Just as civil rights issues gripped our Nation in the 1960's, and nuclear and cold war concerns dominated the 1970's and 1980's, integration of economic and environmental policy has seized the public's attention in the 1990's.

We now understand that we live in an enormously complex global ecosystem: solving one environmental problem can create a new one. Clean-up of surface water has contaminated groundwater and solutions to ground pollution have polluted the air. Actions taken by one country can affect the health of the citizens of another, thousands of miles away and for generations to come. We also know that assessment of environmental achievement is a relative measure. Our successes are meaningful only in terms of reducing overall risk.

We have learned that we must not limit ourselves to clean-up, but must also seek to prevent pollution at the source. We must adopt a comprehensive and understanding approach that avoids unintended consequences of our actions and decisions. We must force ourselves to address long-term and not just short-term consequences.

The 1980's have shown us that environmental action or inaction has economic consequences, in turn affecting our environmental and business choices in a never-ending cycle of cause and effect. Environmental opportunities can be economic opportunities. Money spent by companies to comply with environmental laws and regulation translates into revenues and jobs for other American businesses. The Clean Air Act Amendments are the latest example of how Congressional and EPA action can drive major economic growth in the pollution control sector.

This Administration is committed to identifying the dynamic relationship between economic and environmental needs and to ensuring that environmental assets are reflected in our accounting of national well-being. Environmental protection and economic growth are not incompatible. The Green Gauge Poll of 1992 showed that 63 percent of Americans believe economic development and environmental protection go hand-in-hand.

EPA is evolving as an institution grappling with today's challenges. We must position ourselves to function as more than a regulatory agency. This Administration embraces successful new approaches and the essential dynamic of environmental management handled in partnership across department and governmental lines.

An environment department must work closely with both its Cabinet counterparts and its State, local, tribal and other government partners while remaining responsive to the individual citizen.

We must rely carefully on sound science and research to better understand environmental issues such as biodiversity, global climate change, environmental equity, risk, and persistent toxic chemicals, and to better develop policy and solutions.

An environment department must be a model environmental steward both domestically and internationally. The department must also serve as a model for responsible fiscal practices and responsive, accountable management. Financial integrity and sound contract management are critical to fulfilling our environmental mission and to safeguarding the taxpayer's dollar.

Environmental protection is not a mere footnote but encompasses all of the earth's resources and human activity. It is front-page, banner-headlines woven throughout newspapers, scientific and medical journals, business and law publications. It shapes our daily thinking, strategies, and budgets in every conceivable issue area. We are moving beyond thinking of environmental quality as a luxury or as a hindrance to economic growth. The growth of our economy depends on the availability of a clean, safe, environment and the long-term availability of natural resources.

We can best join the need for balancing growth and the environment by unleashing American ingenuity and creativity to revive our economy and create a new generation of environmental technology, which will make us more competitive in a fast-growing international marketplace.

Both our national environmental ethic and the nature of the ecosystem itself tell us that the President's Cabinet currently is incomplete. In today's world, a successful strategy for any public policy issue requires a holistic perspective that crosses traditional department boundaries. There is virtually no such thing as a policy or problem that does not have environmental aspects or that is simply environmental. A sound approach to the environment is essential to the success and sustainability of our Nation's economic, social, and trade policies.

The President's Cabinet must be able to function as a collaborative and interdependent mechanism, integrating the best public policy-making across department lines. It is not enough that environmental considerations be part of Cabinet decisions and discussions. The environment must be there in its own right as an equal priority and member.

Any student of democracy and public policy would acknowledge a missing building block in the top tier of the Federal Government. Currently, EPA sits in the Cabinet room, but only at the President's invitation. It is time for a permanent chair at the table, institutionalizing the environment as a critical ingredient in the mix of all Federal decision-making.

As our children, pre-kindergarten through college, study the structures that define our democracy and Government, I want to make sure that an environment department is part of their original understanding of what makes our Nation strong. In addition to our children, students of democracy everywhere in the world should comprehend that an environment department is key to America's identity. The United States should join the majority of our other major partners who count an environmental minister as an equal among the top government tier. Not to do so sends the wrong message about our Government's priorities here at home. It also prevents us from asserting the kind of leadership that the rest of the world is looking to us to provide on environmental problems affecting the entire planet.

In conclusion, I assure you that I believe that the creation of an environment Cabinet department means more than a new chair. Joining the Cabinet ensures direct access to the President and, consequently, a voice on behalf of industry seeking to mesh environmental and business concerns and citizens concerned about the environment their children will inherit.

An environment department's involvement in the Federal Government's domestic and international agenda will improve the quality and efficiency of Federal decision-making as the Cabinet addresses all of the Nation's challenges.

Finally, creation of an environmental department signals at home and abroad the highest commitment of the United States to environmental stewardship. S. 171 is consistent with President Clinton's environmental goals. As public officials, we must judge ourselves not only by what we accomplish today, but by the legacy we create for tomorrow.

Thank you for this opportunity to be here today.

Chairman GLENN. Thank you very much.

The President has announced his intention to abolish the Council on Environmental Quality, as already was mentioned by a couple

of the Senators who testified, and to set up a new office of environmental policy in the White House. Can you tell us what the relationship will be with the department, an EPA department, and how this will work? This is a step that causes some raised eyebrows, if you do away with CEQ. How is this going to relate to your department?

Ms. BROWNER. The office that the President has created is one that will serve as a coordinating entity. There are many Federal agencies that involve themselves in environmental issues, either directly or tangentially, and the office within the White House will serve to bring those agencies together in a cooperative manner to make sure that environmental issues are addressed on the front end, not on the back end. I think it is an office that will allow this sort of collegial discussion and debate and consensus-building to take place.

Chairman GLENN. Do you know whether the President intends for there to continue to be an annual environmental report with compiled data from other Federal agencies?

Ms. BROWNER. I am not aware of whether the President intended that to be continued. I would certainly think there is a role for such a report and it is probably something, as a country, we would want to see continued.

Chairman GLENN. Yes. I am interested also in how you are going to prioritize things, or if you have thought about this or you have a group, or how you are going to do this within the agency.

Obviously, we don't have enough money to do everything we would like to do in EPA and particularly in the clean-up area, Superfund. We cannot do all this at once, and so you come down to considerations such as Senator Roth has addressed, and I have joined him in this, in risk assessment legislation. How do you prioritize things; what the President talked about as sort of "outcomes policy", how do you determine what is doable?

You know, as an example, if we wanted to take all the places where there is some nuclear contamination and return them to, say, greenfield status so there is no danger, no radiation, that is a big order. To do that, in some of these places, would cost hundreds and hundreds of billions of dollars for one site for remediation in that particular area, if you could even do it. So some of these areas need different treatment.

Now, you can clean up an awful lot of things with some of this money if you prioritize things as to where the dollars are going to go and maybe some of the toughest problems have to wait a little while and sort of sit in place.

How do you go about prioritizing or doing risk assessment? It seems to me that is key, particularly in your department.

Ms. BROWNER. Mr. Chairman, I absolutely agree with you on the need to prioritize. I think there are several tools available to us and to the Congress in making those sorts of priority decisions, risk assessment being a very important one.

I think we also need to work with the citizens of this country to understand what they perceive to be the most important environmental issues. We need to work with our State, local, and tribal governments to understand what resources they can bring to bear, what they think the priorities are.

One of the important things about environmental protection and environmental regulation is that we are constantly gaining new understanding and new information, and we have to allow for a system that integrates that information as it becomes available and allows us to make changes as we get a better understanding. What we knew 10, 20 years ago when we wrote some of the original laws has changed. We have grown in our knowledge and we need to bring that knowledge to the table. We need to reach out and involve all parties concerned in the issues and seek to establish some sort of criteria for how we then rank or prioritize.

I do not think it is an easy undertaking, but I agree that it is an extremely important one.

Chairman GLENN. You mentioned the coordinating role that the White House will perform in some of these areas, and I am interested in how, not just on a yearly report-type basis, but in how you will do this on a daily basis, because as you mentioned, almost every agency of Government has some function to perform under environmental law, and it is very, very complex.

I like a simple approach, too, of just saying, OK, we elevate, as Senator Roth has talked about and Senator Chafee and Durenberger talked about, and that is very appealing. Just say, we just elevate and that is that. The only reason that we have put in a commission in the bill is to help look at some of these things originally. We have tailored this down, now. It is now just an examination within the agency itself. I do not want this to be confusing. But when we originally talked about getting into EPA and elevating this to Cabinet status, my thought at that time was, we really wanted to simplify Government. There are functions under EPA and environmental law all over the Government, almost in every agency and department. The responsibilities for carrying these things out, it is one of the biggest webs of things you ever saw when you try to put it on an organizational chart.

So we wanted to take as many of those things as possible and say, let us simplify. Let us put them under one head so they can be administered properly and coordinated within one department. We ran into a real buzz saw on that one.

That is the reason that we tried this. But because of all the sacred cows and all the people that have a special interest in CEQ or whatever, everybody had their own pet rock here that they wanted to protect, and so we ran into a real problem in that. What we did was we backed off and said, well, OK, this obviously is above our pay grade in trying to decide these things. These things have got to go somewhere. So we backed off and said, "We will form this commission to look at this with the idea of hopefully coordinating some of these things in Government."

Well, even that idea ran into such opposition that we finally said, "OK, there are enough regulatory problems within the agency itself that we will just let the Commission do that within the agency." But this outside problem is still there, and it is one that you are going to have to deal with. I, frankly, do not know how you do it. It is monstrously complex, almost more than any other department of Government. You have this web of interrelated responsibilities that is all over Government. That is going to be your, I think, your biggest problem.

So, not putting this as a defense of the commission idea, obviously I want to make certain this time around that we have the department elevated, too. If that is a tremendously unpopular thing, well, I still think it is a good idea and we are going to fight for it. But it remains a problem.

I don't know how you deal with that. That is more a statement than a question, I realize, but would you address that briefly?

Ms. BROWNER. Mr. Chairman, I think your point about looking internally to EPA initially is well taken. It is important, I think, before you seek to begin discussions with other agencies on how to resolve some of these overlaps and duplications that you make sure your own house is in order. So we would welcome the opportunity to work with the Commission and work with the Committees to look at the structure internal to EPA as a very, very important first step.

I would also add that I think there are discussions and processes being put in place on a voluntary basis among other members of the President's Cabinet to try and deal with some of the issues that you make reference to. Four of the Cabinet agencies have agreed to meet on a monthly basis, the head of the agencies themselves, with their staff meeting on a weekly basis to have discussions to facilitate communication, where perhaps communication has not existed before.

A lot of the problems that can occur in these areas can probably be solved through enhanced communication at all levels of the agency, from the top on down. You have had communication at lower levels, but you have not always had good communication at the higher levels. We are really hoping to set an example for the employees of all of our agencies about working together in a collegial manner, respecting each other's jurisdiction but recognizing that each agency brings a certain expertise to the table that can be used in conjunction with the expertise of another agency.

Chairman GLENN. Since we have several members here, we are on a 6-minute rule this morning here, just for everybody's information here, Senator Roth.

Senator ROTH. Mr. Chairman, it is my pleasure to welcome Senator McCain here as a new member. I understand he has a further commitment, so if I could, with your permission, yield 3 minutes of my time to Senator McCain?

Chairman GLENN. Fine.

OPENING STATEMENT OF SENATOR McCAIN

Senator McCAIN. Thank you, Mr. Chairman.

Welcome, Ms. Browner. I just want to focus on one issue with you today.

There is a segment of our Nation for whom the standard of effective environmental protection is not being met, and for whom growing environmental problems are ominously adding to the often bleak quality of life they face. In the United States, Indian tribes and the lands upon which they live are not receiving an adequate level of assistance and attention from the EPA.

I'll give you one example: the EPA reports that as of 1988 the agency had provided States with \$48 billion for waste water treatment facilities, while Indian tribes received \$25 million.

I strongly believe that Native Americans deserve a high-ranking and forceful advocate at the policy level of a new Department of Environment.

Let me show you an article that was in the *St. Louis Post Dispatch*, titled "American Indians Hunting Grounds Are Now Dumping Grounds." There is a map in that and I'll provide you with it. There are places all over this Nation which are toxic waste dumps, there is dumping going on all over the Indian Reservations, and there is virtually no enforcement. When we had a landfill in Arizona that was being eroded by flooding and I contacted the EPA, their first response was they had no jurisdiction, when clearly they knew that they did.

Last year, the EPA's failure in Indian country precipitated an uprising within your agency. Obviously you were not there at the time. At an extraordinary meeting in Denver attended by some of the EPA's top officials, Indian experts in the agency laid it on the line that unless the EPA changed course swiftly, they were going to fan out and tell Indian tribes the truth, that the EPA programs were a shambles and their spending a joke.

Another small example: When the new rules were promulgated concerning EPA's new regulations, the States were notified, but the tribes were never even told.

My point is that if we are going to fulfill our obligations not only to the Indians, who are the poorest in our society, but fulfill the solemn treaty obligations we entered into with them, Ms. Browner, I believe that you need a forceful advocate at the policy level. They own a great deal of our country and that is important enough, but the fact is that their lands are being used as dumping grounds. They are then being enticed because of their poor economies—in return for millions of dollars—to use their most sacred asset as toxic waste dump sites without the adequate regulations that apply to other States and communities.

Obviously, you are nodding your head in agreement, but I would appreciate your response to what, in my view, is an incredible lack of fulfillment of our obligation as a Nation.

Ms. BROWNER. Senator McCain, I absolutely agree with you. I think we have failed the tribal communities of this country in terms of working with them to develop their capacity for environmental protection, for ecosystem protection. I can only say that I agree with you and that I am committed to changing this behavior, to making sure that we bring resources to bear, that we work with them in a way that is acceptable to them.

I think it is extremely important. A growing number of communities across this country have environmental equity issues. Environmental justice issues are being raised that we, as an agency, as the United States Government, need to be more sensitive to their heritage and to their community, about what has happened previously. We need to better involve them in the process. I mean, I think that is awful, the example you gave of them not being involved, of them not being notified.

I will absolutely commit to you that I will not allow something like that to continue.

Senator McCAIN. Would you give serious consideration to having a high-level person in your bureaucracy to address those issues?

Ms. BROWNER. I would certainly be willing to discuss that with you. I think it is very important.

Senator McCAIN. Thank you very much.

Thank you, Mr. Chairman. I thank you for your kind words of welcome and I appreciate the opportunity of serving with you again and with our ranking member, Senator Roth.

PREPARED STATEMENT OF SENATOR McCAIN

Thank you Mr. Chairman. I want to commend your efforts, and those of Senator Roth in steadfastly pursuing the goal of elevating the Environmental Protection Agency to a cabinet-level department. The fact that this can be the year to accomplish it bears much promise for all Americans who are passionately concerned about the quality and protection of the environment in our country. If the Congress can pass legislation to create a new Department of the Environment, we will take a strong step forward in fulfilling our obligation to help protect and enhance the magnificent natural resources of the United States for future generations to enjoy.

If it's physically possible to squeeze in yet another dedicated public servant into cabinet meetings—and there may be no more room at the inn—I think we should support a new "Department of the Environment".

In the more than twenty years since the creation of the Environmental Protection Agency, the scope and authority of the EPA has expanded tremendously. In its birth the EPA was a moderate-sized agency which oversaw a handful of environmental statutes. Today, the EPA's regulatory responsibilities have grown to oversee more than fifteen major environmental statutes.

The far-reaching and often historic legislation which has been signed into law since the creation of the EPA reads as testimony to the profound and growing reverence most Americans have for the environment. The passage of the Clean Water Act, Superfund, the National Environmental Policy Act, and the Clean Air Act have all helped protect our Nation's precious environmental assets—but they have also challenged and tested the ability of the EPA to properly fulfill its mandate.

As the challenges and responsibilities of the EPA have grown, so has its budget and staff resources. The agency's funding had increased more than ten times and now approaches \$7 billion, and the number of the agency's employees has nearly tripled. When you look at how critical the EPA's mission is, how vast and complex the environmental problems that face us are, and how important it is for the agency to better coordinate its activities with other Federal departments, the case to elevate the EPA to the cabinet becomes clear.

Creating a "Department of the Environment" with a permanent seat in the President's cabinet will swiftly accomplish several worthy goals. First and foremost, perhaps, is the fact that the Secretary of the Environment will have a steady and permanent seat in the highest policy-making council of the White House. Our Nation's chief environmental officer will be assured of direct access to the President on a continuing basis. This will afford the Secretary of the Environment the opportunity to better serve as an advocate for effective environmental policies and the resources necessary to implement them.

In addition, elevating the EPA to cabinet-status will allow the new department to improve its coordination with other key Federal departments. As a Senator from a western state with a large amount of public lands, I can attest to the complex web of jurisdictional problems that arise between the EPA and a myriad of other Federal and state agencies. Unfortunately, many other Federal agencies have not properly dealt with environmental issues, and don't consider them as a true priority in their administrative and regulatory actions. It is my hope that a new Secretary of the Environment can work in the cabinet to improve environmental policy integration and cooperation with fellow cabinet officers.

I do have several areas of concern regarding S. 171 as the legislation now stands. There is a segment of our Nation for whom the standard of effective environmental protection is not being met, and for whom growing environmental problems are ominously adding to the often bleak quality of life they face. In the U.S., Indian tribes and the lands upon which they live are not receiving an adequate level of assistance and attention from the Environmental Protection Agency.

The administrative structure set up by the EPA to address environmental problems on Indian reservations has not sufficiently served native Americans. Indian programs at the agency are buried within the Office of Federal Activities, and the concerns of native Americans on dozens of reservations are not being heard at a policy-level that is equal to the gravity of the environmental problems that they face.

While some real progress has been made in recent years, the voices of native Americans are still not being heard at the EPA. This lack of input and advocacy at the highest reaches of the agency translates into inadequate resources for Indian programs and a lack of foresight in planning to fully address environmental problems in Indian country. Sadly, this lack of attentiveness and focus is the case in many Federal agencies that touch upon the lives of native Americans.

Just one example is that the EPA reported that as of 1988, the agency had provided states with \$48 billion for waste water treatment facilities, while Indian tribes received only \$25 million. Some funding increases for environmental programs have been achieved in recent years, but serious problems persist, and much more needs to be done. EPA enforcement of environmental protections on Indian lands, whether it concerns contamination of water systems or the dumping of illegal hazardous waste, definitely needs to be intensified.

I firmly believe that native Americans deserve a high-ranking and forceful advocate at the policy level of a new Department of the Environment. I look forward to the views of EPA Administrator Browner in this regard. S. 171 is likely to be the most significant piece of environmental legislation to be passed by the Senate this year, yet nowhere in the bill are native Americans mentioned.

A second concern of mine is how a new Department of the Environment will work to address environmental problems at military installations that will be closed. Thirty-two states have bases slated for closure or realignment, and more will follow. I hope that should a Department of the Environment be created this year, the Secretary of the Environment will work closely with the Department of Defense to ensure that environmental problems at the many bases that will be turned over for civilian use are addressed in a timely and effective manner.

Finally, Mr. Chairman, I hope the committee will take a close look at several of the commissions and conferences called for in this bill. At a time of astronomical budget deficits and indefensible Federal spending, we should carefully consider whether it is necessary to spend \$10-\$15 million on these entities. Despite the general lack of interest in the Congress to restrain new spending, saving \$15 million is still a worthy goal to most hard-working taxpayers in America. This is especially true when they're being asked to shoulder new burdens of unexpected taxation.

Thank you, Mr. Chairman, for the opportunity to present my views, and I look forward to the testimony of our distinguished guests.

Senator ROTH. It is a pleasure to welcome you here, Ms. Browner.

I think at least my principal interest is to see EPA upgraded and my concern is that we have gone down that road four years, all of us, I think, in agreement as to the goal. What worries me is by adding some of these other extraneous, admittedly important, sometimes controversial proposals that we will end up not achieving what I consider what should be the primary goal, making EPA a Cabinet department.

Do you have any recommendations if it came down to a question of simple upgrading EPA to Cabinet status, would that be satisfactory to the Administration as legislation?

Ms. BROWNER. Well, I always hesitate to guess as to what might happen in the legislative process, but I think that the issues that are addressed in S. 171 are very important issues and issues that we do need to address, issues that we need to begin discussions on, dialogues on.

I share the President's commitment to the elevation of this agency, to involving this agency not just in this Administration but in future Administrations, in all Cabinet discussions. It would be my hope that we can move the bill forward in a way that addresses

some of the other concerns that have been raised in previous sessions. But obviously we are open to any discussions that may be necessary if there is a problem at some point in the future.

Senator ROTH. Well, as you know, the problem in the past has been that by opening it up to other amendments, the bill has ended up going nowhere.

Ms. BROWNER. Yes.

Senator ROTH. I think that is the real issue at this time. I am not passing judgment on these other proposals, some of which I may well support, but I am concerned that we are going to end up not succeeding again, and I think that it seems to me that the top priority right now on the part of the Administration, if I may be so bold as to suggest, is to upgrade EPA to Cabinet, then worry about some of these other proposals separately.

Ms. BROWNER. Well, as the President has said on several occasions and as I think you correctly interpret, he is committed to the elevation of EPA. He agrees and I agree that there are some other issues which could be addressed in a timely manner, it would certainly be helpful and would add to the stature of a new Cabinet agency.

But we are absolutely willing to work with the members of this Committee and the members of the Senate as the bill advances to do whatever may be necessary to involve ourselves in whatever discussions may be appropriate.

To go to the comments made by Senator Durenberger earlier, I have every reason to believe that the President will involve himself personally in this effort. He is very, very committed to it and thinks it extremely important.

Senator ROTH. Let me ask one further question; then my time for the first round is up.

Chairman GLENN. That is all right, use your 6 minutes.

Senator ROTH. You stated during your confirmation hearings that cost-benefit analysis was required by Florida law before any environmental rule could be issued, and that in your experience, such analysis had proven useful to you in performing your duties as head of the Florida Environmental Protection Agency.

Will you require a similar cost-benefit analysis of the regulations under your control?

Ms. BROWNER. Let me speak about my experience in Florida, briefly. I found this type of analysis to be extremely useful. There are requirements, if I understand correctly, in the development of rules in all Federal agencies, to look at economic impacts. I am not sure they are of the same detail and structured in the same way that the Florida requirements are, and I would like to look at that to see if perhaps there are ways we can make the information more usable, more understandable, so that those people actually looking at a rule and seeking to comment on a rule in the proposal stage can fully understand what the economic or potential economic consequences may be.

Senator ROTH. Mr. Chairman, I have to go down to the floor, so I will yield back.

Chairman GLENN. All right, fine.

Senator Lieberman.

Senator LIEBERMAN. Thank you, Mr. Chairman and Ms. Browner. Thank you for your statement and the good work that you have begun to do at EPA.

I want to continue, if I can, to talk a little bit about what does or does not go into the bill and to explain why I think this is an opportunity, as we elevate EPA, to make sure that we do not also lose the opportunity to give it the structural strength that I think you need and that the Administration wants to carry out some of its goals.

Perhaps first I should take a moment to try to define this notion of clean bill. I said earlier this is not a clean bill. This is certainly an environmentally clean bill. I think what we are saying is that it is not a legislatively clean bill.

I am a cosponsor of the bill. I think it is a very good bill, but I think it is important to note that it does do more than simply elevate the agency to departmental status. And what it does, the more that it does I think is well done. There is a reason for doing each of the things. For instance, to create the Bureau of Environmental Statistics.

So what I am saying here is that while we are creating this new department—and, of course, none of us want to create an obstacle to its creation—isn't it also important to try to have its structure reflect some of the substantive goals that the Administration and I think the rest of us have for the department?

I guess this is the distinction I would make: It seems to me that it is one thing for somebody to try to add a provision here that would affect takings of land or, to mention one that I might substantively support, to add a provision prohibiting forever the development of oil drilling on the Alaskan wildlife area, those to me are substantive, controversial environmental issues, quite apart from structural improvements or creations in the department that help the department carry out its function.

That is why I have been working, for instance, with Senator Mikulski on the idea of giving you the structural ability to carry out the environmental technology policy that I know you support, or in another sense, to taking the Small Business Office, which is tucked away at this point in the Office of Small and Disadvantaged Business Utilization, which I gather has the primary mission of guarding the rights of small business in the procurement process and really creating the kind of pollution prevention outreach office that I think people want.

The same is true—the Chairman of the Committee entering into the dialogue with you about this whole question of how does the new department truly integrate environmental policy throughout the Government. Well, I think it was with that in mind that this National Commission on the Environment proposed that we authorize the Administration to create a national environmental strategy, beyond just looking at the EPA laws here at the outset of its new status.

So I wanted to explain first, as a strong advocate of departmental status, why I do think that these structural changes can help you achieve the purposes that I know you have and not detract from the potential to adopt the bill that we've got here, and I invite the response to that, if you will.

Ms. BROWNER. If I can presume that you are speaking specifically to the matters and offices that you raised in your opening—
 Senator LIEBERMAN. I am.

Ms. BROWNER [continuing]. Statement, I think that both the Institute for Environmental Technologies and an office for small business are very, very important issues. This Administration is committed to the development of environmental technologies. I think the President's stimulus and long-term investment package includes monies for environmental technologies.

The actual creation of an institution in the short-term is something that I do not feel comfortable addressing. We have been there three, four weeks now. We are coming to understand the structure of the agency and what flexibility we have in terms of reorganizing within the agency, so that those issues of importance to us, to this Administration, can be advanced.

One thing that is becoming increasingly clear to me in these four weeks is that environmental technology development is going to have to become the culture of the agency in the same way that pollution prevention and ecosystem prevention will. You do not want to isolate it, necessarily, but you want to develop a system whereby it is integrated into everything that we do: into our thought process, into the development of rules, into every way in which the agency functions.

So I would say as to that, that would be my only concern at this point in time, and maybe it is something we can continue to discuss. I think that it has got to be one of our highest priorities.

As to the Office for Small Business, I absolutely agree with you on the need to make sure that we are working with small businesses. One of the issues that I pride myself on during my tenure in Florida is the creation of an office to deal with those small businesses that will be most impacted by the new Federal Clean Air Act and the States' responsibilities thereunder.

So I think we agree. Your description of how that office is set up is of concern to me, and it is certainly something I think that we have the flexibility to change within our current structure, so that we can make sure that we actually have a group of people who are reaching out to deal with small businesses on their grounds and in their place of work.

But again, I think it has got to be part of the culture of the agency, that we have got to look at every program, every single thing we do, to make sure that we are listening to how this will impact small business. We are working with small businesses to make sure that they will be able to come into compliance with the law in a timely and economically sensitive way, and I am committed to doing that.

Senator LIEBERMAN. Well, let me just say in response, I know you have only been on the job officially about a month, but I really appreciate the thoughtfulness of your response, even only after a month. I take from it a sense of shared goals here, and I certainly would like to work with you, I am sure Senator Mikulski would as well, to see if we can jointly develop some of these ideas.

The truth is that everything you have said is exactly what I would hope to accomplish with the kinds of amendments we have talked about. I do think, to use the phrase I have used before here,

we need form to guarantee substance. I agree with you that both a responsiveness to small businesses and an advocacy of environmental technology need to become part of the culture of the agency, of the department. But to do that best, I think we need to have some locus of advocacy and responsibility.

Let me just mention to you two things about small business. One is to congratulate you on what you did in Florida in this regard, because I think it is just about the best that has been done in the country at a State level, and secondly, this office of small business ombudsman that exists now, which was just created by Executive act, I think has touched a nerve here, because I noticed in some of my review of it that they set up a hot line.

Ms. BROWNER. Yes.

Senator LIEBERMAN. They receive over 20,000 calls a year, which shows that there is a real need for something like this out there.

Thank you.

Ms. BROWNER. You are exactly right. The hot line has been tremendously successful and we will probably need to do more of that sort of outreach.

Chairman GLENN. Before we go to Senator Cochran, I just wanted to comment.

We have talked about a stripped-down bill. We passed a bill here last year. It was not a stripped-down bill, but I think it is our opinion that even a stripped-down bill would not have passed the House last year, because in our discussion with the people over there, I do not think the House wanted a stripped-down bill. In fact, they were going the other direction: they wanted to include a lot of other things in there and establish some policy in anything that was going to pass over there. So I do not think it is just a free ride here. If we put a stripped-down bill in, that does not mean it is going to go through the House, necessarily.

Senator Cochran.

Senator COCHRAN. Thank you, Mr. Chairman.

I just came from a meeting of the Rules Committee where we were going over the funding resolution for all of the committees of the Senate. One of the issues that we were having to face is a cutting back of size in terms of staffing, reducing each standing committee's budget by 10 percent, all of these things that we are doing right now here internally in the Senate to try to cut back on costs.

I wonder, in view of the President's speech last night and his challenge to cut back, tighten up, and try to find ways of saving money, if we are not running this morning just in the opposite direction and at cross purposes with the President's challenge, by having this hearing and seriously considering establishing a new department in the Executive Branch, which requires adding more employees. Have you looked at this legislation from the point of view of cost implications, or has this been—there is a new word I have learned in the last few weeks from this Administration—a vetting. Have we had a vetting of this bill, to the extent that we know whether there will be additional costs?

Ms. BROWNER. Senator, you raise a very good point. I have two comments in response. The CBO has estimated that the elevation from agency status to department status will cost approximately \$30,000. That speaks to the elevation. The bill speaks to some other

issues and there are costs associated with that. It would not be our intention to go out and reprint all of our stationery and change all of our signs. In commitment to the environment, we will use up our stock and then as things have to be replaced, the name will be changed. But we do not anticipate any tremendous cost associated with the elevation.

In terms of the other issue you mentioned, the President's commitment to reduction of the Federal workforce, we are working within the agency on that very issue right now. We believe we will be able to meet the President's goals. We are also looking within the office of the administrator, my office, to cut back in terms of our expenses, to cut back in terms of our staff and the pay for that staff. I feel quite confident that we are going to be able to make some significant strides there.

Senator COCHRAN. The Department of Agriculture, I was noticing in the news this morning, has some areas where it will be cutting back, too. One of the things that I personally had the privilege of doing earlier in my Senate career was chairing the Subcommittee on Appropriations that funds the Department of Agriculture and related agencies. Within that department, I am familiar with the fact that there are several environmentally related functions. The conservation reserve program, pest management practices, best management practices, that are talked about in terms of technical assistance to farmers and agriculture producers to try to communicate the latest in information about how to use pesticides wisely and safely.

To what extent is this new department, in your view, going to take those responsibilities and manage them and maybe make unnecessary the functions that are now being performed by the Department of Agriculture in these environmentally related areas?

Ms. BROWNER. We look forward to working with all of the Federal agencies that involve themselves with departmental issues in a cooperative, nonduplicative way. My experience at the State level was that the Soil Conservation Service was one of the best tools we had for working with farmers out in the field, on their property, to try and develop best management practices. It was a very cooperative relationship. We did not seek to replace them. We did not seek to take over their jobs. Their job is much broader than just the environmental concerns that an environmental agency would be predominantly concerned with.

So what I will hope to do, and what I think was able to do in Florida, is to look for these opportunities of cooperation, to respect what other agencies have done historically and their expertise, and to bring our expertise to them so that they can use it, and vice versa.

Senator COCHRAN. The agency, up to this point, has performed functions under statutes that have given it the responsibility for issuing regulations and administering laws, like the NEPA. The Council on Environmental Quality, as I understand it, is to be abolished. Has that already been abolished just by Executive Order, or will it be?

Ms. BROWNER. It is my understanding that that will take an Act of Congress. The CEQ has statutory responsibilities and executive responsibilities. Obviously, the executive responsibilities can be ad-

addressed through an Executive Order, but the statutory responsibilities will take an Act of Congress.

Senator COCHRAN. Do you foresee the new department assuming the responsibilities of that Council on Environmental Quality?

Ms. BROWNER. The NEPA requirements and responsibilities that CEQ currently handles have been the subject of discussion among a variety of people here on the Hill, on both sides, and the White House and various agencies. Those discussions are ongoing and hopefully there will be a solution that will be acceptable to all parties. It may be that some of the NEPA functions would be appropriately managed by EPA.

Right now we do manage some of the ministerial functions under a delegation from CEQ to EPA. We have some roles because CEQ was never really staffed to handle them. It may be appropriate for those to continue in our agency, but we are open to a discussion on this, to make sure that the NEPA functions are preserved and are placed in the right agency or agencies.

Senator COCHRAN. Thank you very much.

Senator LEVIN [presiding]. Thank you, Senator Cochran.

Let me add my welcome to you, congratulations to you, and express my support, also, for making the EPA a department. Elevation would say a lot about where we place the environment in terms of our national priorities for us to upgrade that status.

I have had some practical experience with the current situation. We have adopted an act which I authored called the Great Lakes Critical Programs Act, which requires development of the Great Lakes Initiative. I come from a State which is in the center of the largest system of fresh water in the world. A good part of our drinking water comes from the Great Lakes. They are a precious, unique asset. They hold 90 percent of our Nation's surface fresh water,

The Chairman and I and other members of this Committee and the Congress who come from that area particularly understand its unique position in the world, as well as on the continent. We have dedicated ourselves to protecting that environmental asset and talk about it as the fourth coast, but a unique coast—it is fresh water.

The EPA has been helpful in a lot of ways in implementing the Act. One of the things the Act does, for instance, is to require that uniform water standards be set for the Great Lakes States. We also set some deadlines in the Act for cleanup and for management plans for the Great Lakes, but one of the things we focused on is uniform water quality standards.

The EPA has proposed those standards and sent them to OMB.

Ms. BROWNER. Right.

Senator LEVIN. These are just a proposal for public comment.

Ms. BROWNER. Right.

Senator LEVIN. And there they sit. And sit. And sit. The deadline established by law has been ignored by OMB. This is the old OMB, of course, not the new OMB. But nonetheless, it has been ignored.

One of the advantages of giving you Cabinet status is it will raise your level to the point where, when you tell OMB, get on with it now, your voice will be heard a lot more clearly and forcefully than in the current situation.

Because of the importance of this proposal, I would ask you, are you familiar with the Great Lakes Initiative, with the Great Lakes Critical Programs Act of 1990? Are you familiar with that particular situation where these proposed draft regulations are sitting on an OMB staffer's desk somewhere?

Ms. BROWNER. Senator, I am very familiar both with the program—I have received, I think, two briefings, now—and also with the fact that the role has been at OMB. If I might just explain how I think the relationship with OMB is developing in this Administration, I think it will be a very different one than in prior Administrations.

You are probably aware that OMB sent out a memo shortly after the President's inauguration asking the new agency heads to review rules that were somewhere in the pipeline between an agency and on the desk of a staffer at OMB. The first group of rules we looked at included 32 rules. Within 10 days, all of them were moved out. I think that is a record for OMB, and they are doing that without all of their people in place. So I am very optimistic that we are going to see a more responsive, a more timely OMB. They seem very committed.

The rule that you make reference to was captured in a second group of rules that we were asked—they broke them into different categories, depending on whether they were proposed and whether they had been signed by the prior Administrator. That rule is in the second grouping. We are working on it right now and will be discussing that with OMB in the not too distant future. Hopefully we will be able to begin a process whereby we not only meet our statutory deadlines in terms of rule-making responsibilities, but also overcome and get behind us the far too many court-imposed deadlines we now find ourselves, as an agency, dealing with.

Senator LEVIN. Those court-imposed deadlines in many instances are the result of the agency not acting on their own. I happen to agree with you. It is far better that the agency act on its own promptly without the requirement that we set a statutory date. But those dates frequently come from frustration.

Ms. BROWNER. Right. I have no argument with the people who have sought the use of the courts to get the agency to do what the agency was told to do by Congress. I would just hope that in this Administration we can turn that around and instead of spending our time in court litigating a new date, spend our time meeting the original date.

Senator LEVIN. There are two programs that EPA has funded or has helped fund in the center of the Great Lakes that very much relate to environmental protection. One is called the Consortium for International Earth Science Information Network, the acronym is CIESIN, and this has to do with the dissemination of environmental data collected by the Federal Government, particularly relative to global change information.

The second program that I want to ask you about is called the Center for Ecology Research and Training, which has the EPA's first supercomputer, and it is the only one in the world that is dedicated solely to environmental science.

Both of these are important, not just to EPA's broader programs, but particularly to the Great Lakes.

Are you familiar with either of those programs, and if not, could you become familiar with them and let me know about your plans to continue EPA's support for those programs?

Ms. BROWNER. I am somewhat familiar with both of those. I had hoped to be able to visit the supercomputer this week, but there were some needs for changes in my schedule. I do hope to visit it in the not too distant future, and would be more than happy to discuss with you the future and what is an appropriate commitment.

Senator LEVIN. Good. The center is not too dissimilar, in terms of its purpose in linking information technology to the protection of a natural system, from what you identified in Florida's strategic vision before you came to EPA.

Ms. BROWNER. Right.

Senator LEVIN. Thank you again, and congratulations again.

Ms. BROWNER. Thank you.

Chairman GLENN [presiding]. Thank you.

Last night, we were in the House Chamber and heard the President's address. You were sitting in the front row. The Joint Chiefs of Staff were immediately behind you. I was behind the Joint Chiefs of Staff, directly behind you. One of the biggest lines of the evening was when the President said that with regard to Superfund, we have got to stop all the money going to the lawyers and see that it goes to cleaning up the environment, or words to that effect, anyway.

As I recall, you were one of the first on your feet, applauding that line and I was close behind you on that. [Laughter.]

How are we going to do it? How are you going to do it, with us supporting you?

Ms. BROWNER. Well, you raise a very difficult issue, one that I think everyone who has been involved with the Superfund program agrees is a problem. The solutions are not yet there. I think there are things we can do internally in the agency in terms of better managing the money, and moving more expeditiously in developing remediation plans, cleanup plans, monitoring plans.

But I think it is going to take a bringing together of all affected parties: the industries who are responsible for the cleanups; the municipalities who are now having to absorb an increased financial responsibility for cleanups; the citizens' groups who live in those communities; the Congress; the regulatory agencies. We are going to have to come together and, as much as possible, put aside our past history or the adversarial nature of the debate that has taken place thus far and see where we can develop a consensus.

I think there are many good things in the law, but it is also time, as is appropriate in all of our environmental laws at times, to bring the new knowledge we have about cleanups, about what may be appropriate in terms of cleanup and about technologies that were not available 5 years ago, to a conversation, to a discussion, and seek to develop consensus.

Chairman GLENN. Well, I think by any measure by anybody, EPA or anybody else, the success of the Superfund concept has been minimal to practically nonexistent. That overstates it a little bit, but not a whole lot.

This Committee started some years ago, along with the General Accounting Office and OMB, a study of high-risk areas of Govern-

ment where we could see the possibility of wasting many, many tens or even hundreds of billions of dollars, and we have continued that through the last 4 years or so, analyzing these things.

The GAO took the initiative of putting together a high-risk series of booklets for this transition period, here. One deals with environmental problems.

Ms. BROWNER. Yes.

Chairman GLENN. You may be familiar with those. If not, I commend them to your perusal. In that, they say the estimated costs of cleaning up Superfund sites has grown rapidly over the past 12 years. At the end of Fiscal Year 92, EPA had obligated about \$11.4 billion, but had completed cleanups at fewer than 12 percent of the current Superfund sites, even after all these years.

EPA has estimated the fund's share of the cost to clean up current sites would be \$40 billion and recognizes that many more sites will be added to the Superfund over time.

A 1991 University of Tennessee study estimated that if Superfund grew to 6,000 sites, cleanup costs for EPA in the private sector, excluding costs for Federal facilities and Superfund's administration, could amount to \$300 billion in 1990 dollars over the next 30 years.

That is going to be one of the biggest single money problems you face. I know you talk about bringing research to bear on it, and that is what we are going to do, but I think the President pretty well hit it on the head last night. We have had a huge overhead cost in that program and not a whole heck of a lot of cleanup to show for it.

I do not know the answer to it. Maybe it is such a difficult problem there is not much you can do about it. But I think, once again, you have to prioritize what are the most dangerous sites first, and there have been attempts made to do that. I do not know how successful those have been. Where the greatest danger, the greatest number of people is, has to be the concentration of your energies there, and the dollars, if we are going to see that get cleaned up. That is more a statement than a question.

But it does lead into another thing, and that is your budget. I would like to ask what is going to happen this year when the final figures come out. Maybe you do not know those yet and they are still being hassled through OMB, but how do you view the resources that the EPA has had in the past? Do you need to expand it? Do you need more support from here, less?

For instance, you mentioned research. I noticed in 1992 you had \$502 million going into research with 12 labs administering that. Is that adequate, and are you going to have enough to do the job that you are going to be expected to do?

Ms. BROWNER. Well, to do the job that I think most Americans expect us to do probably takes more money than anyone is prepared to give to the agency. We can work within the budget that the President has suggested for our agency. What we have to do as an agency is manage our resources better. I believe there is room for better management of our resources, for making wiser choices in how we spend our dollars.

Chairman GLENN. What is your budget now? What is the budget that you are inheriting?

Ms. BROWNER. It has been roughly \$6.9 billion, with 17,469 FTEs. The numbers have been somewhat moving around a little bit. A great portion of that goes to grants and to revolving loan programs. I mean, it moves out into the States and into local government.

It is a large budget. I do not want to suggest that it is not.

As we look across this country, one of the things I think is very important in terms of our environmental goals and environmental protection, is that we need to become better partners with State and local governments. You have many States who have contributed and made the tough decision to bring a lot of resources to bear. We need to recognize that, we need to work with them, and we need to look at this as a whole. We need to look at who can take what responsibility and who is better suited to do what.

Chairman GLENN. What do you anticipate after you get done massaging all these figures around? What is going to be your new budget?

Ms. BROWNER. Probably be about the same.

Chairman GLENN. About the same. You do not anticipate any—

Ms. BROWNER. We will experience what all agencies are dealing with, in terms of the inflationary cuts and in terms of FTE's. We will experience the same thing that other agencies are experiencing.

Chairman GLENN. That gets into a whole other area of outside contracting and so on that really has been a problem at EPA, too. We wanted to get into that, too.

Ms. BROWNER. Yes.

Chairman GLENN. Senator Lieberman.

Senator LIEBERMAN. Thank you, Mr. Chairman.

Just one more question, Ms. Browner, and that is on this matter of national environmental strategy and what you think about it.

Those who advocate it do so, and I include myself, but I am speaking particularly of the former administrators of EPA who through this commission have advocated it, do so, I think, out of a desire to see us not only create the Department of Environmental Protection as a structural entity, but to take this opportunity to give it both a mandate and a strategy to carry out its goals and, through that process, enable the Secretary of the department, the administration, to reach out and involve the States and the public as well.

Also, though it is not a requirement, it seems pretty clear from Agenda 21, the document that we signed at the Earth Summit in Rio last year, that there is a very strong appeal to the Nations of the world to do just this, to adopt national environmental strategies.

How do you feel about it?

Ms. BROWNER. Well, I think it is important that we have today a strategy outlining where as a country, as a world, we want to be moving. It is something that I worked very hard on in Florida for the State of Florida. We developed a 10-year plan off of which we were then able to develop annual plans that drove our budget and other decisions within the agency.

But environmental protection and quality of life protection is something we are going to have to look at over a very long term.

Having some long-term vision that can help us shape the immediate term, in terms of the choices we make, is a good idea.

Senator LIEBERMAN. Thank you.

Thank you, Mr. Chairman.

Chairman GLENN. Thank you.

Senator Cochran.

Senator COCHRAN. Mr. Chairman, thank you.

In connection with a question I asked about the additional costs that could be expected to be incurred as a result of elevating the agency to department level, you mentioned the \$30,000 that the CBO said would be required because of increases in salaries, and I was looking at the other parts of the bill, too. One thing that we probably ought not to overlook is that the bill before us, which was passed by the Senate in the last Congress, requires other things to be done, besides just elevating the agency to department level, such as establishing the Bureau of Environmental Statistics, encouraging an international meeting that would be sponsored by various departments, and establishing a Commission on Improving Environmental Protection.

CBO looked at these requirements and estimated, according to the committee report from two years ago, that \$2.8 million would be required in the first year after enactment, \$5.4 million in the second year, and such sums as necessary in subsequent years for just the Bureau of Environmental Statistics.

If an international meeting is held, it could cost as much as \$5 million, according to the committee report, but since the bill does not require the meeting to be held, the CBO did not really include that in their letter to the Committee on costs.

Then the Commission on Improving Environmental Protection: the bill authorizes an appropriation of \$3 million in the first year and \$5 million in the second year to support the Commission's activities.

It seems that if we pass the bill as drafted, there will be substantial additional costs other than just adding to the salaries of the Secretary and the Assistant Secretary and the new Assistant Secretary position.

Had you taken another look at that? These are old data, and I wonder whether or not this is something that will be reviewed by your agency and a new response given to us about what the increases, if any, in the cost of these additional items would be, given inflation and other things that might have happened since then.

Ms. BROWNER. Senator, the agency has begun to look at those other issues that you mention in the bill. We can certainly provide you all with that information. I do not know if the Congressional Budget Office is also revisiting those issues, but obviously that is something that we can determine.

Senator COCHRAN. Is all of this other really necessary, in your judgment, or can the department handle it internally, without the direction of a statute telling you how to do your job?

Ms. BROWNER. Well, there are several issues. If you would not mind, I will try and get through them quickly.

The Bureau of Environmental Statistics is an important creation. There is a need to have one place in Government where environmental statistics are collected and analyzed. We would not propose

to in any way duplicate work that is already being done by other agencies, but, rather, to provide a forum where that information can be brought and where it can be analyzed.

We would also not propose—and I do not think the bill does this—that the bureau take on any sort of new monitoring requirements. It would be a bureau very similar to the Bureau of Labor Statistics, a place where numbers are analyzed, where numbers are collected, so that any member of the public, industry, State governments, other agencies has that information available to them in a manner in which they can use it.

The Commission, as it now exists in the bill, is something that would—and I think I mentioned this earlier—provide the new agency with an opportunity to look internally in the agency, in terms of where we might avoid some duplication, where there might be some opportunities to streamline how we might involve some of the other priorities that we now all understand to be so important to environmental protection, such as pollution prevention strategies, technology development, market incentives. It is something that is timely. The agency is, I guess, 21 years old now. It is probably time to look inside.

I know that in some of the original bill versions, several years ago the Commission would have looked more broadly. In this particular version, it does not, and as I said earlier, I think it is important that we look inside our own house first. So we would find that useful.

Senator COCHRAN. I think one area to consider exploring, in terms of revamping, upgrading, and trying to reestablish, if that is a good word, public confidence in Government decisions and pronouncements in the area of health risk assessment. I do not know of any other area that is more controversial than that.

I can recall when Meryl Streep came up and testified that Alar was killing our children if the apples that were contaminated were permitted to be included in the lunch program. Everybody in America believed that, absolutely. Then in the same sequence, we had the EPA administrator, and the highest officials we could get from both the Food and Drug Administration and the Department of Agriculture come before the Committee to discuss the facts and what the risks were. They basically said that the facts had been grossly exaggerated and that there was no basis for the fear and all the reaction that occurred as a result of that statement.

How are we going to meet the challenge in the future of dealing with situations like that, to get the facts out to the public in a way that is convincing enough so that they will not be stampeded by an alarmist or somebody who may not have all the facts? I am not saying that Meryl Streep did not have all the facts, but in a situation similar to that—because there are a lot of other areas, too—what is your view about that? Are you going to continue to contract out most of these health risk assessments to people who may be driven by political considerations, rather than a sound scientific basis?

Ms. BROWNER. Well, several comments. In terms of our contracting, I would certainly not seek to contract with people who are driven by political rather than scientific analysis. I think it is extremely important that the integrity of this country's environmen-

tal agency be held in the highest regard and to the highest standard.

What we do is incredibly important to every American for a variety of reasons, and we must act with caution where appropriate, with speed where appropriate, but we must act based on the best science available to us, and we must tell the American public the truth. They are not dumb. They will understand what we have to say if we tell them in an honest and truthful manner.

That is what I would hope to be able to achieve to educate the public. None of this is easy. There are no simple answers. But as a country, I think we can do a better job in terms of protecting our environment, of leaving our air, land, and water cleaner for future generations. We will all have to participate in those efforts.

Senator COCHRAN. Well, I wish you well. I do not know of any other challenge that is more important right now for us to deal with than restoring confidence in the American people in our Government and the ability of Government officials to make correct and good policy decisions.

I am satisfied that you have your heart in the right place, and I wish you well. I brought that up because it is something that I remember going through and trying to help deal with, in terms of finding out what the facts are and then getting them out to the American people. It is really a very difficult thing to do, when you are confronted with some of the forces that are at work in that community.

Ms. BROWNER. Thank you.

Chairman GLENN. We are going to have to move along shortly. We will all submit additional questions, I am sure, that we hope you would respond to so we could have it as part of the record. Mine will be along several lines, and I will just make a couple-minute statement here on what they are.

EPA contracting out: The agency has basically been run by contracting out since it was formed. There have been some real abuses here. We had a hearing on it last year; we may want to send you that hearing record for you and your staff to look at on some of the abuses that came out at that time.

This Committee, particularly under Senator Pryor's subcommittee, has taken the lead in looking into some of this outside contracting. There are many abuses in Government and the testimony we had was really a prime example of how EPA has almost become a captive of its contractors, could not operate without it now in any way, shape, or form. The question is whether you do outside or inside work with civil service, whether we continue contracting out and what all that means.

Another area would be the organization of the agency, your relationship with the States, with regions, how you contract out with the States where the attorneys general in the different States do some of the activity under what is, in effect, a contract with EPA, as I understand it. How that works out. Your operation with your inspector general—the inspectors general are creatures of this Committee, as a matter of fact. We expanded that a couple of years back. Basically, you have done an excellent job and so we want to talk about that a little bit.

Your enforcement programs: We had another hearing where the EPA brings charges and then a big penalty is assessed and then the whole thing falls down. It is all negotiated down. We had, time after time, testimony to the effect that it is cheaper for people to go ahead and pollute and get caught again and pay the next fine which was negotiated down, so long as the fines do not go up. So there is not really the incentive to obey the law and put in pollution controls.

So I will have a series of questions along those lines.

Senator Lieberman, do you have any last comment here?

Senator LIEBERMAN. No.

Chairman GLENN. Senator Cochran?

Senator COCHRAN. No, Mr. Chairman.

Chairman GLENN. All right. Thank you very much for being here.

We have another panel this morning. Dr. Jay Hair, President of the National Wildlife Federation, Dr. Steve Gage, President of the Cleveland Advanced Manufacturing Program, and Doug Costle, former EPA Administrator, who brings that expertise to the table, so we welcome all of you this morning.

Dr. Hair.

If everyone can get shuffled as fast as possible here, we would appreciate it. We do understand that Doug Costle has a scheduling problem today, so we will have him on first.

Gentlemen, we appreciate your patience this morning in bearing with us. It has been a rather long morning here but productive also. We have been getting through a lot of areas.

Mr. Costle, if you would lead off, we would appreciate it.

**TESTIMONY OF DOUGLAS M. COSTLE,¹ FORMER EPA
ADMINISTRATOR, FORMER DEAN, VERMONT LAW SCHOOL**

Mr. COSTLE. Thank you, Mr. Chairman.

It is a pleasure to come before this Committee again and to commend you for your persistence and your determination to get this accomplished.

I would like at the outset to present to the Committee on behalf of myself and four other former Administrators of EPA a strong letter of support for the bill that you have introduced. I will submit that at this time for the record, with your permission. It is signed by Russ Train, Bill Ruckelshaus, Lee Thomas, myself, and Bill Reilly.

Chairman GLENN. Without objection, it will be included in the record.²

Good. That is a good group of people to be signed on for any environmental comment.

Mr. COSTLE. As you know, I supported S. 2006 two years ago and I enthusiastically support S. 171. Over the past two years I have served as a member of two commission groups that have examined a broad range of environmental policy issues. Participating in the activities of the National Commission on the Environment and the Carnegie Commission on Science, Technology, and Government has

¹ The prepared statement of Mr. Costle appears on page 96.

² See page 101.

given me a further opportunity to reflect on what we have done, what our Nation's record is, and what we face moving ahead.

As a result, I feel even more strongly than I did two years ago that it is time to elevate EPA to Cabinet status, and I am pleased to see that President Clinton and Vice President Gore have moved so quickly to endorse this idea.

I believe Federal organizational changes are needed now. Some may often question the usefulness of expending time, resources, and political capital on organizational and procedural reforms, but there are also instances in which inattention to organization and decision-making processes can impede and has impeded and undermined the decision-making capacity of the Government and its ability to respond to societal needs.

Failure to align Government programs to address these problems effectively will restrict our capacity to respond. Public health, environmental quality, and economic performance are increasingly all at risk, unless we take decisive steps now to develop a national strategy that improves our decision-making on environmental issues.

As Carol Browner said a few moments ago, we are moving from a command and control regulatory regime to a more economic incentive-based approach, from end-of-the-pipe treatment to pollution prevention, from concern primarily about cancer-causing risks caused by toxic substances to noncancer and ecological threats, and very importantly, from directing our efforts mostly to problems within our national borders to international and global challenges.

I think your colleagues who appeared initially this morning, yourself, sir, in your opening statement, have more than adequately laid out the rationale for at this time elevating EPA to Cabinet status. I would also support what seems to be emerging as a 2-step process. That is, to move with a relatively clean bill at this point to accomplish the upgrading, but recognizing at the same time that there is a lot more that needs to be done if we are to get our organizational house in order.

You obviously are the best judge of what a clean bill means, in the context of this session of the Congress, but I would certainly give my support to your judgment on that matter.

The President has already expressed his intention to replace the Council on Environmental Quality with an Office of Environmental Policy, and I am not sure of all the details, frankly, of the President's proposal. I would defer, therefore, a judgment on precisely what it is he is recommending. But clearly he recognizes that there is a compelling need to integrate our new awareness of global environmental imperatives into a range of other important national priorities, including those dealing with energy, transportation, agriculture, industrial renewal, and national security. Indeed, it is time to begin over a period of time a sustained examination of the premises underlying national policies in these other areas of Government activity and begin to bring them more in line with our growing understanding of what the requirements will be for sustainable development going into the future.

The reality is, when EPA was created, it was an agency to clean up pollution. Let us face it, much of the thrust of the early environmental legislation has been driven by the need to play catch-up

clean-up, or to put it another way, we have been preoccupied with trying to clean up after the fact the polluting side effects of 20th century technologies which were conceived largely in ignorance of their singular or cumulative environmental impacts.

Today, as we approach the 21st century, we are on the verge of what I believe will be major changes in our industrial economy. In fact, I suspect we are in for a very difficult transition in this country. But, indeed, we have no choice but to reform if we are to maintain our stature as a principal player in a very competitive global economy.

It would be, in my judgment, a tragedy of enormous proportions if we fail to heed the lessons of this century as we approach the economic opportunities of the next, if we fail to shape the next generation of technology with an eye towards the long-term health of the global commons.

The United States should lead in this new industrial reformation. The global market for green technologies is already large and growing, but the United States must face the fact that it will take a set of calculated public policies applied over a sustained period of time if we are, in fact, going to stimulate the private investment needed to bring about this greening of technologies.

There is also a manifest need to reduce our consumption of fossil fuels, both for environmental and national security reasons, and the new Energy Policy Act takes some important steps in the right direction. But there will be much more needed to be done in the area of energy taxes, full product pricing, incorporating the full costs of environmental degradation into the price tag of commercial products.

I speak to these issues, Mr. Chairman, simply to underscore the fact that the environmental mission of the National Government today is quite significantly different from what it was in 1970, when we created EPA. It is now important that we begin to develop a national environmental strategy that recognizes these sets of changed circumstances.

With your permission, I would like to submit for the record a report that was prepared this last year that I alluded to earlier by the National Commission on the Environment. That report is titled, "Choosing A Sustainable Future."

With your permission, I would submit that for the record.¹

Such a strategy should include explicit statements of the long-range and near-term environmental goals that the Nation is working to achieve and should state how progress in achieving them will be measured. A national environmental strategy should attempt to identify emerging problems and present a plan for responding to them over a sustained period of time.

I think also that the Congress and the EPA should take a careful look now at how we have organized the agency's Office of Research and Development and consider consolidating its laboratories and developing a set of environmental research institutes in order to upgrade the quality and extend the capability of EPA's research

¹ This report is retained in the committee files.

program. Dr. Gage, I believe, intends to speak more to that later this morning.

These ideas, in addition, are discussed in more detail in the report of the Carnegie Commission on Science and Technology in Government entitled, "Environmental R&D Strengthening the Federal Infrastructure." That was also a panel in which I was privileged to participate, and I would like your permission to submit that, too, for the record.¹

I think we all understand, judging from the remarks already made this morning, that we are beginning to embark on a significant and probably, spread over a considerable period of time, reexamination of how we are organized to deal with these problems. This is an important first step. I would really like to lend my support to your sense, Senator, that we need to now take a more reasoned and sustained look at a range of organizational alternatives.

One of the issues, for example, is how we conduct global environmental monitoring. My own personal preference would be to see NOAA, geological survey consolidated to form the basis of a new geophysical science services administration, linked up with NASA and its capabilities. There is a growing body of opinion that says this makes sense. It may not be possible to accomplish that today, tomorrow, or this session or the next session, but these are the kinds of issues that we need to look at.

I think it is also going to be important if we upgrade EPA to Cabinet status to realize that we have got to also pay attention to how the White House is organized to deal with these issues.

Both of the commissions on which I serve felt very strongly that we need to strengthen the capacity of the Executive Office of the President to look at these cross-cutting policy issues, not diminish that capacity. The task is not simply coordination, but to take a more strategic look at the long term, as I said earlier, these long-term policies in energy transportation, etc.

It appears that the steps they are taking moves in that direction, and I would encourage the support of that. But they need to strengthen, not weaken, the capacity of the Executive Office of the President to help a new, fledgling Department of Environment deal with these issues, even as it develops the longer-term look and longer-term institutional capability that we all see is needed.

Mr. Chairman, I would just close with that and ask that, I have sort of summarized my testimony, but with your permission I would like to submit it in its entirety.

Chairman GLENN. The entire statement will be included in the record.

Chairman GLENN. Thank you. We know you had a time constraint, and we will submit additional questions to you. Whenever you have to leave, why, we understand.

Mr. COSTLE. Thank you, Mr. Chairman. It is a pleasure to see you again.

Chairman GLENN. Thank you.

Dr. Jay Hair, President, National Wildlife Federation.

Jay, welcome to the hearing again.

¹ This report appears on page 103.

TESTIMONY OF DR. JAY D. HAIR,¹ PRESIDENT, NATIONAL WILDLIFE FEDERATION

Dr. HAIR. Thank you, sir.

I am grateful to have the opportunity to testify before you today to urge that S. 171 be passed in this Congress to place EPA in the Cabinet. Elevation of EPA to Cabinet is long overdue. The National Wildlife Federation recognized this fact in 1986, when we first launched this important initiative.

Mr. Chairman, you and your staff are to be applauded for once again taking the lead in this vital issue. Let us hope that by this Earth Day, April 22, your efforts will finally come to fruition, and we pledge our efforts to work with you to make that happen, sir.

With your permission, I will briefly summarize three points, if I could have my entire text included in the official statement.

Chairman GLENN. It will be included in the record.

Dr. HAIR. First, the protection of the Nation's environment is critical to the quality of life of every U.S. citizen and to the country's economic vitality. Therefore, environmental concerns must be central to deliberation of the Nation's highest policymaking forum, the President's Cabinet.

Second, protecting the environment and conserving natural resources is a global issue requiring strong, aggressive United States leadership. Unprecedented cooperation among nations will be needed to tackle trans-boundary environmental problems. In its current status, EPA is unable to directly negotiate on issues like global warming and ozone depletion because international protocol reserves that authority to Cabinet-level officials.

There is no better illustration of this point than the position of U.S. officials at last year's Earth Summit in Rio. Negotiations on global environmental issues on behalf of the United States were led by the State Department, while EPA officials were relegated to supporting roles. It is astonishing that the United States is one of the few nations that does not have a Cabinet-level minister or department for the environment.

Finally, I want to touch on a thread that leads to my other two points that we need, both in this country and abroad, to make environmental protection the centerpiece of economic growth. As President Clinton told the Joint Session of Congress last night and the Nation, one of the major challenges of this decade will be to incorporate environmental stewardship into our way of doing business. In contrast to the theme of the Reagan-Bush years, that the Nation must choose either economic or environmental protection, it is becoming increasingly clear that environmental protection is critical to economic competitiveness. Economies resting on a dwindling maturing resource base are doomed to failure.

Finally, in addition to elevating EPA, S. 171 establishes a bureau of environmental statistics within the new department, a presidential commission improving environmental protection, and also urges the convening of an international meeting on energy efficiencies and renewable resources. These provisions will improve the

¹ The prepared statement of Dr. Hair appears on page 252.

new department's performance in important areas and we support them.

In closing, Mr. Chairman, let me commend you once again for this important initiative. The quality of life of our citizens and the strength of our economy depend upon a healthy environment, and a Department of Environment will be one way of ensuring that at the highest levels of government.

Thank you, sir.

Chairman GLENN. Thank you, Jay. Thank you very much.

Dr. Stephen Gage, President, Cleveland Advance Manufacturing Program, I have had the pleasure of visiting that facility in the past up there.

Dr. Gage, we welcome you to our hearing.

TESTIMONY OF DR. STEPHEN J. GAGE,¹ PRESIDENT, CLEVELAND ADVANCED MANUFACTURING PROGRAM

Dr. GAGE. Thank you, Mr. Chairman.

To begin, I would like to point out that, from 1974 to 1980, I was with the U.S. Environmental Protection Agency here in Washington. During the Carter Administration, I served as Assistant Administrator for Research and Development under Administrator Doug Costle, and I am delighted to join him here this morning.

I am pleased to have the opportunity to comment on S. 171 and on several related matters. With your permission, I would like to submit a more detailed statement for the record.

Chairman GLENN. It will be included in the record. Thank you.

Dr. GAGE. The summary this morning will just touch on a few of the points. First, I would like to add my support to your efforts to elevate the U.S. Environmental Protection Agency to Cabinet status. Each passing year makes it more essential to have a Secretary of the Environment in the President's Cabinet.

I understand the politics is the art of the possible, that we should move deliberately and that a clean bill at this time may be the best environmental strategy. I hope, though, that elevation of EPA to Cabinet status is just the first step of a general reorganization of environmental programs within the Federal Government.

If the Department of Environment is to serve the best interests of Americans, it must be driven by more than just regulation. Otherwise, we should leave it as an independent regulatory agency. One thing that the department should do is maintain a better balance between its regulatory efforts and its commitment to good science and technology as a basis for understanding the environment and dealing with threats to it. The department should have cognizance over monitoring the quality of U.S. and global environment and promptly reporting positive and negative trends. Finally, the department should have the Federal lead on environmental issues from cleaning up past abuses at home to stemming environmental devastation globally.

It should be recognized that EPA has recently made progress in stabilizing its science and technology efforts, after a decade of considerable turmoil. Its Office of Research and Development has over

¹ The prepared statement of Dr. Gage appears on page 253.

the last several years taken modest, but important steps in reorganizing and streamlining its activities. EPA should also be commended for recompeting the awards for university-based centers of excellence this past year. This is a positive step in reinvigorating the important work that EPA supports in the Nation's universities. Five centers were selected. However, these are still very seriously under-funded. These are useful steps, but they still do not address the basic challenges facing our Nation and the world in providing an adequate scientific and technological base for dealing with current and past pollution.

Since 1988, the Carnegie Commission on Science and Technology in Government has commissioned a number of studies. Mr. Costle mentioned the one study called "Environmental Research and Development: Strengthening the Federal Infrastructure," and I would just like to select two out of the many recommendations in there, to give you an example of the types of issues that ought to be considered.

The first I have selected to illustrate the continued fragmentation of U.S. environmental efforts even after 22 years. The first recommendation, "A new Federal agency, the U.S. Environmental Monitoring Agency should be organized by combining the National Oceanic and Atmospheric Administration now within the Department of Commerce with the U.S. Geological Survey now within the Department of the Interior."

Monitoring, mapping, inventorying and forecasting with respect to the National and global environment are really the cornerstones of Federal environmental protection efforts, but most of these functions do not now lie under the purview of EPA.

Two key players, as you might have guessed, are NOAA and USGS. Moving them out of their existing departments and combining them would establish the highly professional independent capability that the Nation clearly needs. This agency could operate as an independent Federal agency or as an entity within the Department of Environment. The Bureau of Economic Statistics called for in S. 171 would logically be combined with an environmental monitoring agency.

The second recommendation reads: "A Federal interagency environmental technologies program should be established to promote and support the development of advanced technologies by Federal agencies, universities, industry and non-governmental organizations."

Such a program would provide support to Federal agencies and the private sector through grants, loans and cooperative agreements. The Department of Environment could function as the lead Federal agency providing funds to other agencies and other institutions. EPA has experience in administering programs of this type.

In the 1970's, the Federal Interagency Energy Environmental R&D program successfully coordinated efforts with 16 Federal agencies. I was intimately familiar with that program, since I was its initial director beginning in 1974. I am convinced that a similar program focused on environmental technology development could also be successful, such as that proposed in the legislation introduced in the last Congress by Representative Joseph Kennedy, which would establish such an interagency program.

I would just like to make a couple of additional comments with respect to the commercialization of environmental control technologies, because without commercialization, the technologies just end up sitting on the shelf. Technologies are invented and commercialized by entrepreneurs and enterprises with the intent of making profits. The risk-takers are involved in all of the necessary functions and expect to get a timely and reasonable return on their investments.

But one of the major factors is whether an individual or venture capital firm or private company decides to invest is the amount of uncertainty, market response, market size, cost of development, etc. High uncertainty is high risk and higher risk demands higher returns or no deal.

Well, since it doesn't seem to be obvious to all, most environmental control technologies are created in response to regulations. They are regulatory driven, rather than market driven and, hence, introduce a new variable into the picture. The uncertainty takes many different forms, but most often it involves delays, will lawsuits cause the regulations to be delayed or sent back to the agency for rework, will the Congress, through subsequent amendments, change the compliance deadline, etc.

When there is a cost advantage associated with the new control technology, a company may well take on a project, as long as the benefits which can come to that company outweigh all of the risk, including the additional risk of the potential delays.

One of the most encouraging developments over the last couple of years has been the emergency of pollution prevention or waste reduction. Former EPA Administrator William Reilly undertook very important initiatives in this regard, and a growing number of companies are accepting the twin premises that a healthy economy can be good for the environment and a healthy environment can be good for the economy.

Leading companies, such as 3M, DuPont, Dow Chemical, Polaroid and AT&T, have adopted very innovative pollution prevention programs and are demonstrating that these efforts can improve their bottom lines.

Technology often plays a very major role in avoiding pollution generation, but not as an after-the-fact end-of-pipe treatment. New production process may be used, existing process may be returned and closely monitored, feedstock substitutions may stop creation of by-products. How will these promising new approaches, which may significantly reduce pollution with a cost savings, be factored into a major push for environmental control technology? Given EPA's traditional reliance on end-of-pipe treatment technologies, this answer is not obvious to me.

Finally, I would just like to reiterate that regulatory uncertainty hovers like a black cloud of commercialization of environmental control technologies, and that is why I feel the bill introduced in 1992 by Senator Mikulski really does little to solve the problems. There are some interesting features in that bill, such as the low-interest loan fund which could supplement the supply of private capital, but I feel that such a loan fund really would work much more effectively within a department of the environment, where there is a much greater likelihood that regulatory policy can be

balanced with technology development policy, all for the good of the environment.

Thank you for this opportunity.

Chairman GLENN. Thank you.

I thank all three of you. Dr. Gage, on the prevention versus clean-up debate. I have always thought that was an area that could be very fruitful, if we ever got into it. I don't quite know how we do it, because a lot of the industrial processes we wind up having to clean up after, later on become very expensive. I don't know if we have any way of submitting them in advance or something? It seems to me we just have to have an awareness in this area.

Perhaps one thing is to have EPA be far more stringent in administering its penalties and not negotiating them down when there are violations, and that makes businesses then think twice before they just dump something out in the open. Is that a way of approaching this, or what is a better way of doing it?

As in medicine, we all know we should get a check-up once a year as a means of prevention, instead of waiting until we get sick and then trying to cure it, and you can make that same analogy with respect to the environment. How do we handle that?

Dr. GAGE. I think very definitely strict penalties are playing a major role in changing the mindset of many of the leaders of American industry.

Chairman GLENN. One of the problems is they have been strict. That is a problem. They are strict on paper and then they negotiate them down. We had a hearing on that and it was absolutely atrocious. I think the fines collected are something like 15 percent of the original fines, on the average.

Dr. GAGE. Well, the financial aspect is one thing. There is also another bracing thing that I know has fixed the minds of many CEO's around the country, and that is that a few CEO's have been sent to jail. They are serving time behind bars and there is nothing that has quite concentrated the minds of some of our CEO's as with that prospect.

Chairman GLENN. That would be only the most extreme cases, though, where you would send somebody to jail.

Dr. GAGE. Right.

Chairman GLENN. I think what we are looking for is day-in and day-out, how do you make people aware that a new process may—

Dr. GAGE. I think that a lot of the company presidents are also reading the tea leaves, that in fact things will get stricter, that there has probably been a decade of relative laxness here in application of fines, and that the companies themselves, including the CEO's, as officers of the companies, may face long-term financial liabilities. As I spoke in my testimony about risk, this has entered into the risk calculation, the financial risk calculation in companies and is having a very significant impact.

You can read the speeches of the CEO of 3M, Dow Chemical and a number of these companies that state very clearly that what they are trying to do is to minimize their long-term financial risk and, thus, put the company in better financial shape by undertaking pollution prevention programs. They also end up in many cases saving money, and driven by the bottom line here, they are in

many cases putting into place very vigorous pollution prevention programs.

There is an element of this whole effort that is being driven very much in the private sector. I think one of the real challenges to EPA and the Department of Environment is to try to find some incentives to try to spur the growth of this effort on and move it down to the medium and smaller size companies. We are working really from the bottom-up with many small companies and they are beginning to see the sense of it. But what we need to do is really get a conflagration going, so a lot more companies will look to their bottom lines in pollution prevention.

Chairman GLENN. You actually ran the research program there for a while. How many years were you there?

Dr. GAGE. I was there from 1974 to 1980 and ran the entire research program from 1977 to 1980.

Chairman GLENN. Well, you have had some experience in that area, then. Out of the \$7 or \$8 billion budget over there, I believe, what is it, about \$500 million goes to research now?

Dr. GAGE. I think at this point it is right at \$500 million.

Chairman GLENN. No researcher or director of any research program is ever going to say they have enough money, but is the \$500 million out of the \$7 or \$8 billion, is that a reasonable amount, or is that woefully underfunded?

Dr. GAGE. I don't think it is woefully underfunded. I think there can be some very important strategic investments made. The Office of Research and Development suffers from the malady that you were talking about earlier and basically having to contract everything out.

I had the pleasure of serving through three reductions in force which brought our head count in the Office of Research and Development down by about 20 percent during the time I was there, and that left us only about 1,500 or 1,600 government employees, so we ended up trying to manage a third of a billion-dollar budget with those individuals and literally hundreds and hundreds of outside contractors. So I think the problem is really more systemic than it is financial.

Chairman GLENN. Have you looked into research, Mr. Hair? What do you think of EPA's research budget? Is it adequate?

Dr. HAIR. Well, the question of adequacy always is the mind of the beholder. I think the most important thing about research that I can say is that too much of the kind of research we are doing now is providing answers for which we have not yet defined what the questions are, and so it is really important that EPA focus on what the priority questions are that the research input ought to try and identify.

We have not made, as a nation, adequate investment in understanding the fate of chemicals in the environment, either individually or how they accumulate over time. We have not made adequate investment in EPA's research program for the effect of genetic engineered products into the environment. We have not made adequate research investment into understanding both risk assessment and how to transfer that into risk management. So money is one question. The question in my mind, though, the first priority is what are the research priorities.

Chairman GLENN. Risk assessment is one that I brought up earlier this morning and is one area where we are getting into several different areas of government. I am not quite sure how you do this and attach a dollar figure to it, which then results in management approaching it from that standpoint.

Mr. Costle, you were involved with all this, how do you prioritize things? How do you set up a risk assessment group? That seems very difficult to me to do. Is it possible to do that? You have to make some estimates. You have to do that, otherwise you don't know where to spend your scarce dollars.

Mr. COSTLE. That is exactly right, and I think risk assessment can help you do that. I think we also have to understand that the current methodology for risk assessment is somewhat primitive and is driven in large measure not by data, but by a lot of assumptions that are made in terms of how you run the modeling, so you have to be very, very cautious about how it is used.

On the other hand, it can tell you a lot about relative order or risk and a lot of other factors go into deciding what risk you in fact go out and choose to regulate. Your ability to actually accomplish something is one factor that goes into that. There are some risks we don't know how to regulate.

Yes, I think we are at a point now where we are in for constrained resources for a while, we are going to have to set priorities, we can't escape that. There are a variety of ways to help you do that. It should be done explicitly and openly and debated. I think there is a real need to look across not just at EPA's \$500 million and whether that is being spent more efficaciously.

But I think you need to look at what environmental research is going on across the government, and I think there is a need, for example, to articulate a national environmental research strategy and that ought to be pulled together by the Office of Management and Budget under the guidance of the Vice President and the Assistant to the President for Environmental Policy, but it ought to have the active participation of Jack Gibbons at the Office of Science Adviser to the President, and we ought to take for the first time a careful, thoughtful look and say do we have a well-articulated strategy or does it look more like Swiss cheese and who is doing what. I mean that is the reality of the world we are going to be in and it hasn't been done.

Chairman GLENN. Is there a lot of international expertise out there? As the biggest energy users, we are the biggest polluters in the world and we think that we are the experts in environmental control. But as the Rio Conference indicates, there is a lot of interest all over the world and this is a problem that blows and flows across international boundaries. Do we take advantage enough of research and experimenting going on in other countries?

Mr. COSTLE. Well, I think there has been a tremendous upsurge in research by other countries. In many respects over the last decade, they have mode out ahead of us. And whether we are adequately capturing the benefit of their research and development, I don't really know, but I think we need to have increasingly the capacity to have a clearinghouse for that research and development, and we probably will need to do some very careful coordination internationally on research and development.

Chairman GLENN. Would that be within EPA or, because it is international, is it going to automatically fall under the State Department to do something with it?

Mr. COSTLE. Right now, it falls between the cracks. I think if you create a Department of Environment, with a more broadly conceived mission of developing a national and international environmental strategy, it can participate in that, it can provide some of the support structure to see that gets done.

Chairman GLENN. Dr. Hair, you were going to say something a moment ago?

Dr. HAIR. Going back to your first question, Senator, the best definition that I have heard of risk is that it is a function of hazard and outrage. Two examples: If you live adjacent to a hazardous waste site that may be totally contained, you are not being exposed in any capacity, the hazard is, let us say, theoretically zero, but the outrage is high, because, as a citizen in that community, you don't know the extent of your exposure, because we haven't as a society communicated that adequately.

On the other hand, if you take the occurrence of naturally occurring radon in many homes around America, the hazard is quite high, frankly, but the outrage is quite low, because it is naturally occurring. So there is a combination of needs that we as a nation have to address, one, better understanding what risk and relative risk means and communicating that effectively to people so they can make responsible decisions about what they are or are not willing to tolerate in terms of risk.

You ask some questions of the earlier panels about Superfund and its failures in a variety of ways. Much of that comes from the question of risk, and one of the really critical questions that has to be addressed in its reauthorization is that, in dealing with that question, we have to look forward to what is going to be the use of that particular land.

For example, if it is an industrial site that is going to remain as an industrial site in the future, it is absurd to have the society clean that up to a zero background tolerance, to a tolerance where we would want to have children playing in it. If that site is going to be used for inhabitation, it is as very different kind of issue. So those are some of the fundamental questions that we have to get at in terms of the larger risk question, how we communicate them, and then allowing the public to responsibly participate in the decision-making process.

Chairman GLENN. That is a hard one, but there needs to be some way of doing that and I don't know how you do that exactly. I think we are going to have in some of our sites—I hate to even say this, but I think it is going to be so expensive to clean up some of these spots, we may be better advised to at least temporarily memorialize them, put a fence around them and a guard on the gate and use the money to clean up many more sites elsewhere. I don't know how you prioritize things like that.

I come back to our experience with the nuclear situation, the nuclear weapons program, where the chant was "The Russians are coming, the Russians are coming, we have got to produce." What are we going to do with the waste? Well, we will put it out behind

the plant and we will worry about that later, and that is what we did for about 35 years and now we are trying to clean up.

Some of those places I am not sure are ever going to get cleaned up, because it is more expensive and more dangerous to more people. If you try and take the waste out of a particular site and move it some place, you may create far more hazard than if you say, OK, put a barrier around this thing and a guard on the gate and that is it for a while until we sometime maybe learn how to handle it, and that may be the best use of our money—to build a fence, rather than trying to dig up this waste. How you prioritize it and put it into something that is doable, I don't know.

Mr. Costle.

Mr. COSTLE. Yes, I think you have touched on a fascinating question, frankly, that there are now a lot of different groups wrestling in anticipation of the reauthorization of the Superfund, wrestling with what do you do about these things. You know, I have looked at this to some degree and, of course, I was EPA Administrator when we passed the bill, but it was in the lame duck portion of 1980 and I was not here to implement any of it.

So I look at it probably from a more relaxed vantage point than anybody who has got the present responsibility. But I am also aware, having been a businessman and being in the environmental business for a while, of some of other things that are happening that have to be kept in mind, as you approach reauthorization of the Superfund.

The big controversy has been over the issue of joint and several liability and that in fact is what is driving the transaction costs, what sends companies to their lawyers, because of their fear that they may be the deep pocket and they see no end to what their liability might be. The fact is that provision has rarely been used. It is considered to be the gorilla in the closet that may look more emaciated, if you ever take it out of the closet, than it is in reality.

But let me tell you for a fact, Mr. Chairman, that liability provision is doing more than any other single thing I can think of to change the pattern of corporate behavior today. I mean they are not creating new Superfund sites. They see increasingly the future and it is the concern about liability that is causing them to see the future in terms of how do you go to low-waste, no-waste technologies, how do we change our industrial technology, how do we position ourselves to be able to account for what it is we produce in the way of hazardous waste, and that we manage it more carefully in the future. That is having a profound effect on current and future corporate behavior.

I think there are ways to get at the issue of past liability in the context of these existing sites we are trying to clean up. I think first you have got to bring certainty, some certainty to what the cost is really going to be. EPA has got to foster joint settlement, that is joint funding settlements where there is participation there. You can create mechanisms for—

Chairman GLENN. How do you do that? How do you determine the cost in advance? That has been the most indeterminate thing. That is a problem. They start in the Superfund and they start into a site and all at once the cost has quintupled and tripled all over

the lot, because people were not able to make estimates or they don't, anyway.

Mr. COSTLE. The first thing they have to do is acknowledge limits of current technology to clean up these sites. I mean I think you put your finger on it. There are some sites we are just going to have to quarantine, take reasonable remediation steps, come back to when we have new technologies, monitor adequately in the meantime. We cannot afford to go do everything at every site. I think that is part of the key. I think we need a more concerted effort to encourage and develop innovative clean-up technologies. There is a lot we can do to improve the efficiency of the settlement process.

I think it is not that everybody wants to simply be able to make a contribution and walk away from these sites, because I don't think that is realistic. But I think that you can cap responsibility in the near term, set up an adequate financial mechanism to guarantee monitoring, create in the meantime the kind of programs that encourage technology innovation and come back in a reasonable time later when additional clean-up technologies will in fact be feasible.

But at some point the government has got to bite the bullet on the issue of how clean is clean enough for now, and that I think takes away much of the sting that lies behind this fear of the joint and several liability, that it may be unlimited.

Dr. HAIR. A small point, Mr. Chairman, is that, despite I think some significant progress made under Administrator Reilly, there still is a very significant lack of public confidence in the whole process of what defines clean-up standards. I think a real strong case can be made and ought to be looked at by a committee like this is turning this into a public works project, where in fact the U.S. Army Corps of Engineers becomes the contracting management agency for the public. They are basically looking for a new mission. They have dammed up all the rivers in America and now they want something new to do, and this would be a wonderful way to take that massive engineering capacity and turn it into a public works project that serves the American people better.

Chairman GLENN. I am not sure they agree with your characterization of their duties.

Dr. HAIR. They have also drained a few swamps, too. [Laughter.]

Chairman GLENN. We are into about the 13th year now, I guess we are into the 13th year of Superfund, right?

Mr. COSTLE. Yes, I think so.

Chairman GLENN. And as GAO said—and you were here when I read this earlier today out of the high-risk series that we have sponsored with GAO—at the end of 1992, EPA obligated \$11.4 billion, and after 13 years we only cleaned up 12 percent, clean-ups completed at fewer than 12 percent of the Superfund sites, and they are talking \$40 billion and maybe going out with the additional sites they see now, maybe \$300 billion over the next 30 years. I think the response to the President's remark last night that I brought up earlier to Administrator Browner indicated what people think about this. He said we are going to take that money away from lawyers and put it into cleaning things up. Hooray, a

big response, everybody on their feet cheering last night for that one, and I was among them.

I don't know how we do a better job with Superfund, but I know we have got to do something, I know that.

We are way over our normal time here and I appreciate you being here. Obviously, we could go on all afternoon on this. I do have a number of questions still on some international issues and on regulatory review.

I go back to Ohio and the way wetlands is being interpreted now, you go along mowing the grass along the road, you have got a cattail over there in the ditch, you have got to pull that cutter bar as you go by, put it on down, or you are breaking the law.

Dr. HAIR. You should not have built that highway in the wetlands in the first place, Senator. [Laughter.]

Chairman GLENN. Or you talk about a farmer that used to plow every year out there some place, and he has a low spot in the land and now it develops some subsurface water and moss and some aquatic thing in that area, because you go to no-till, you don't plow it every year now. Now, though, once every 7 or 8 years, even under no-till, you have to plow that stuff up. By law, he cannot plow it up now, if he has got a cattail in there or whatever it is. So you have some interpretations in environmental things that people just see as just absolutely ridiculous. So this environmental review and regulatory review and some of the environmental things have to be looked at, too.

Dr. HAIR. It is important, though, to remember that basically agricultural practices are exempted from section 404 of the Clean Water Act.

Chairman GLENN. Yes. Anyway, I will submit some questions to you for your early response, so we can include this as part of the record.

Chairman GLENN. I am sorry we kept you so long today, but it has been very interesting, and obviously we could go on for days here.

Thank you much.

The hearing stands in recess subject to the call of the Chair.

[Whereupon, at 12:27 p.m., the Committee adjourned, subject to call of the Chair.]

APPENDIX

103D CONGRESS
1ST SESSION

S. 171

To establish the Department of the Environment, provide for a Bureau of Environmental Statistics and a Presidential Commission on Improving Environmental Protection, and for other purposes.

IN THE SENATE OF THE UNITED STATES

JANUARY 21 (legislative day, JANUARY 5), 1993

Mr. GLENN (for himself, Mr. BOREN, Mr. BRADLEY, Mr. BRYAN, Mr. BUMPERS, Mr. COHEN, Mr. DODD, Mr. GRAHAM, Mr. JEFFORDS, Mr. KENNEDY, Mr. KOHL, Mr. LEAHY, Mr. LEVIN, Mr. LIEBERMAN, Ms. MIKULSKI, Mr. RIEGLE, Mr. LAUTENBERG, and Mr. SASSER) introduced the following bill; which was read twice and referred to the Committee on Governmental Affairs

A BILL

To establish the Department of the Environment, provide for a Bureau of Environmental Statistics and a Presidential Commission on Improving Environmental Protection, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE AND TABLE OF CONTENTS.**

4 (a) **SHORT TITLE.**—This Act may be cited as the
5 “Department of the Environment Act of 1993”.

- 1 (b) TABLE OF CONTENTS.—The table of contents is
 2 as follows:

Sec. 1. Short title and table of contents.

TITLE I—ELEVATION OF THE ENVIRONMENTAL PROTECTION
 AGENCY TO CABINET LEVEL

- Sec. 101. Short title.
 Sec. 102. Findings.
 Sec. 103. Establishment of the Department of the Environment.
 Sec. 104. Assistant Secretaries.
 Sec. 105. Deputy Assistant Secretaries.
 Sec. 106. Office of the General Counsel.
 Sec. 107. Office of the Inspector General.
 Sec. 108. Bureau of Environmental Statistics.
 Sec. 109. Grant and contract authority for certain activities.
 Sec. 110. Study of data needs.
 Sec. 111. Miscellaneous employment restrictions.
 Sec. 112. Administrative provisions.
 Sec. 113. Inherently governmental functions.
 Sec. 114. References.
 Sec. 115. Savings provisions.
 Sec. 116. Conforming amendments.
 Sec. 117. Additional conforming amendments.

TITLE II—ENVIRONMENTAL ROLE OF THE UNITED STATES IN
 INTERNATIONAL ORGANIZATIONS TO WHICH IT BELONGS

- Sec. 201. International energy conference.
 Sec. 202. International greenhouse gas monitoring program.

TITLE III—ESTABLISHMENT OF THE COMMISSION ON IMPROVING
 ENVIRONMENTAL PROTECTION

- Sec. 301. Establishment; membership.
 Sec. 302. Commission responsibilities.
 Sec. 303. Report to the President and Congress.
 Sec. 304. Commission staff.
 Sec. 305. Advisory groups.
 Sec. 306. Funding; authorization of appropriations.

TITLE IV—EFFECTIVE DATE

- Sec. 401. Effective date.

TITLE I—ELEVATION OF THE ENVIRONMENTAL PROTECTION AGENCY TO CABINET LEVEL

SEC. 101. SHORT TITLE.

This title may be cited as the "Department of the Environment Act".

SEC. 102. FINDINGS.

The Congress finds that—

(1) recent concern with Federal environmental policy has highlighted the necessity of assigning to protection of the domestic and international environment a priority which is at least equal to that assigned to other functions of the Federal Government;

(2) protection of the environment increasingly involves negotiations with foreign states, including the most highly industrialized states all of whose top environmental officials have ministerial status;

(3) the size of the budget and the number of Federal civil servants devoted to tasks associated with environmental protection at the Environmental Protection Agency is commensurate with departmental status; and

(4) a cabinet-level Department of the Environment should be established.

1 **SEC. 103. ESTABLISHMENT OF THE DEPARTMENT OF THE**
2 **ENVIRONMENT.**

3 (a) REDESIGNATION.—The Environmental Protec-
4 tion Agency is hereby redesignated as the Department of
5 the Environment (hereafter referred to as the “Depart-
6 ment”) and shall be an executive department in the execu-
7 tive branch of the Government. The official acronym of
8 the Department shall be the “U.S.D.E.”.

9 (b) SECRETARY OF THE ENVIRONMENT.—(1) There
10 shall be at the head of the Department a Secretary of the
11 Environment who shall be appointed by the President, by
12 and with the advice and consent of the Senate. The De-
13 partment shall be administered under the supervision and
14 direction of the Secretary.

15 (2) The Secretary may not assign duties for or dele-
16 gate authority for the supervision of the Assistant Sec-
17 retaries, the General Counsel, the Director of Environ-
18 mental Statistics, or the Inspector General of the Depart-
19 ment to any officer of the Department other than the Dep-
20 uty Secretary.

21 (3) Except as described under paragraph (2) of this
22 section and section 104(b)(2), and notwithstanding any
23 other provision of law, the Secretary may delegate any
24 functions including the making of regulations to such offi-
25 cers and employees of the Department as the Secretary
26 may designate, and may authorize such successive

1 redelegations of such functions within the Department as
2 determined to be necessary or appropriate.

3 (c) DEPUTY SECRETARY.—There shall be in the De-
4 partment a Deputy Secretary of the Environment, who
5 shall be appointed by the President, by and with the advice
6 and consent of the Senate. The Deputy Secretary shall
7 perform such responsibilities as the Secretary shall pre-
8 scribe and shall act as the Secretary during the absence
9 or disability of the Secretary or in the event of a vacancy
10 in the Office of Secretary.

11 (d) OFFICE OF THE SECRETARY.—The Office of the
12 Secretary shall consist of a Secretary and a Deputy Sec-
13 retary and may include an Executive Secretary and such
14 other executive officers as the Secretary may determine
15 necessary.

16 (e) REGIONAL OFFICES.—The Secretary is author-
17 ized to establish, alter, discontinue, or maintain such re-
18 gional or other field offices as he may determine necessary
19 to carry out the functions vested in him or other officials
20 of the Department.

21 (f) INTERNATIONAL RESPONSIBILITIES OF THE SEC-
22 RETARY.—(1) In addition to exercising other international
23 responsibilities under existing provisions of law, the
24 Secretary is—

1 (A) encouraged to assist the Secretary of State
2 to carry out his primary responsibilities for coordi-
3 nating, negotiating, implementing and participating
4 in international agreements, including participation
5 in international organizations, relevant to environ-
6 mental protection; and

7 (B) authorized and encouraged to—

8 (i) conduct research on and apply existing
9 research capabilities to the nature and impacts
10 of international environmental problems and de-
11 velop responses to such problems; and

12 (ii) provide technical and other assistance
13 to foreign countries and international bodies to
14 improve the quality of the environment.

15 (2) The Secretary of State shall consult with the Sec-
16 retary of the Environment and such other persons as he
17 determines appropriate on such negotiations, implementa-
18 tions, and participations described under paragraph
19 (1)(A).

20 (g) AUTHORITY OF THE SECRETARY WITHIN THE
21 DEPARTMENT.—Nothing in the provisions of this Act—

22 (1) authorizes the Secretary of the Environ-
23 ment to require any action by any officer of any ex-
24 ecutive department or agency other than officers of
25 the Department of the Environment, except that this

paragraph shall not affect any authority provided for by any other provision of law authorizing the Secretary of the Environment to require any such actions;

(2) modifies any Federal law that is administered by any executive department or agency; or

(3) transfers to the Department of the Environment any authority exercised by any other Federal executive department or agency prior to the date of the enactment of this Act, except the authority exercised by the Environmental Protection Agency.

(h) APPLICATION TO THE DEPARTMENT OF THE ENVIRONMENT.—The provisions of this Act apply only to activities of the Department of the Environment, except where expressly provided otherwise.

SEC. 104. ASSISTANT SECRETARIES.

(a) ESTABLISHMENT OF POSITIONS.—There shall be in the Department such number of Assistant Secretaries, not to exceed 10, as the Secretary shall determine, each of whom shall be appointed by the President, by and with the advice and consent of the Senate.

(b) RESPONSIBILITIES OF ASSISTANT SECRETARIES.—(1) The Secretary shall assign to Assistant Secretaries such responsibilities as the Secretary considers appropriate, including, but not limited to—

- 1 (A) enforcement and compliance monitoring;
- 2 (B) research and development;
- 3 (C) air and radiation;
- 4 (D) water;
- 5 (E) pesticides and toxic substances;
- 6 (F) solid waste;
- 7 (G) hazardous waste;
- 8 (H) hazardous waste cleanup;
- 9 (I) emergency response;
- 10 (J) international affairs;
- 11 (K) policy, planning, and evaluation;
- 12 (L) pollution prevention;
- 13 (M) congressional, intergovernmental, and pub-
14 lic affairs; and
- 15 (N) administration and resources management,
16 including financial and budget management, infor-
17 mation resources management, procurement and as-
18 sistance management, and personnel and labor rela-
19 tions.
- 20 (2) The Secretary may assign and modify any respon-
21 sibilities at his discretion under paragraph (1), except that
22 the Secretary may not modify the responsibilities of any
23 Assistant Secretary without substantial prior written noti-
24 fication of such modification to the appropriate commit-
25 tees of the Senate and the House of Representatives.

1 (c) DESIGNATION OF RESPONSIBILITIES PRIOR TO
2 CONFIRMATION.—Whenever the President submits the
3 name of an individual to the Senate for confirmation as
4 Assistant Secretary under this section, the President shall
5 state the particular responsibilities of the Department
6 such individual shall exercise upon taking office.

7 (d) CONTINUING PERFORMANCE OF FUNCTIONS.—
8 On the effective date of this Act, the Administrator and
9 Deputy Administrator of the Environmental Protection
10 Agency shall be redesignated as the Secretary and Deputy
11 Secretary of the Department of the Environment, Assist-
12 ant Administrators of the Agency shall be redesignated as
13 Assistant Secretaries of the Department, and the General
14 Counsel and the Inspector General of the Agency shall be
15 redesignated as the General Counsel and the Inspector
16 General of the Department, without renomination or re-
17 confirmation.

18 (e) CHIEF INFORMATION RESOURCES OFFICER.—(1)
19 The Secretary shall designate the Assistant Secretary
20 whose responsibilities include information resource man-
21 agement functions as required by section 3506 of title 44,
22 United States Code, as the Chief Information Resources
23 Officer of the Department.

24 (2) The Chief Information Resources Officer shall—

1 (A) advise the Secretary on information re-
2 source management activities of the Department as
3 required by section 3506 of title 44, United States
4 Code;

5 (B) develop and maintain an information re-
6 sources management system for the Department
7 which provides for—

8 (i) the conduct of and accountability for
9 any acquisitions made pursuant to a delegation
10 of authority under section 111 of the Federal
11 Property and Administrative Services Act of
12 1949 (40 U.S.C. 759);

13 (ii) the implementation of all applicable
14 government-wide and Department information
15 policies, principles, standards, and guidelines
16 with respect to information collection, paper-
17 work reduction, privacy and security of records,
18 sharing and dissemination of information, ac-
19 quisition and use of information technology,
20 and other information resource management
21 functions;

22 (iii) the periodic evaluation of and, as
23 needed, the planning and implementation of im-
24 provements in the accuracy, completeness, and

1 reliability of data and records contained with
2 Department information systems; and

3 (iv) the development and annual revision of
4 a 5-year plan for meeting the Department's in-
5 formation technology needs; and

6 (C) report to the Secretary as required under
7 section 3506 of title 44, United States Code.

8 **SEC. 105. DEPUTY ASSISTANT SECRETARIES.**

9 (a) ESTABLISHMENT OF POSITIONS.—There shall be
10 in the Department such number of Deputy Assistant Sec-
11 retaries as the Secretary may determine.

12 (b) APPOINTMENTS.—Each Deputy Assistant
13 Secretary—

14 (1) shall be appointed by the Secretary; and

15 (2) shall perform such functions as the Sec-
16 retary shall prescribe.

17 (c) FUNCTIONS.—Functions assigned to an Assistant
18 Secretary under section 104(b) may be performed by one
19 or more Deputy Assistant Secretaries appointed to assist
20 such Assistant Secretary.

21 **SEC. 106. OFFICE OF THE GENERAL COUNSEL.**

22 There shall be in the Department, the Office of the
23 General Counsel. There shall be at the head of such office
24 a General Counsel who shall be appointed by the Presi-
25 dent, by and with advice and consent of the Senate. The

1 General Counsel shall be the chief legal officer of the De-
2 partment and shall provide legal assistance to the Sec-
3 retary concerning the programs and policies of the Depart-
4 ment.

5 **SEC. 107. OFFICE OF THE INSPECTOR GENERAL.**

6 The Office of Inspector General of the Environmental
7 Protection Agency, established in accordance with the In-
8 spector General Act of 1978, is hereby redesignated as the
9 Office of Inspector General of the Department of the
10 Environment.

11 **SEC. 108. BUREAU OF ENVIRONMENTAL STATISTICS.**

12 (a) ESTABLISHMENT.—(1) There is established with-
13 in the Department a Bureau of Environmental Statistics
14 (hereafter referred to as the “Bureau”). The Bureau shall
15 be responsible for—

16 (A) compiling, analyzing, and publishing a com-
17 prehensive set of environmental quality statistics
18 which should provide timely summary in the form of
19 industrywide aggregates, multiyear averages, or to-
20 tals or some similar form and include information
21 on—

22 (i) the nature, source, and amount of pol-
23 lutants in the environment; and

24 (ii) the effects on the public and the envi-
25 ronment of those pollutants;

13

1 (B) promulgating guidelines for the collection of
2 information by the Department required for the sta-
3 tistics under this paragraph to assure that the infor-
4 mation is accurate, reliable, relevant, and in a form
5 that permits systematic analysis;

6 (C) coordinating the collection of information
7 by the Department for developing such statistics
8 with related information-gathering activities con-
9 ducted by other Federal agencies;

10 (D) making readily accessible the statistics pub-
11 lished under this paragraph; and

12 (E) identifying missing information of the kind
13 described under subparagraph (A) (i) and (ii), re-
14 viewing these information needs at least annually
15 with the Science Advisory Board, and making rec-
16 ommendations to the appropriate Department of En-
17 vironment research officials concerning extramural
18 and intramural research programs to provide such
19 information.

20 (2) Nothing in the provisions of paragraph (1) shall
21 authorize the Bureau to require the collection of any data
22 by any other Department, State or local government, or
23 to establish observation or monitoring programs.

24 (3) Information compiled by the Bureau of Environ-
25 mental Statistics, which has been submitted for purposes

1 of statistical reporting requirements of this law, shall not
2 be disclosed publicly in a manner that would reveal the
3 identity of the submitter, including submissions by Fed-
4 eral, State, or local governments, or reveal the identity of
5 any individual consistent with the provisions of section
6 552a of title 5, United States Code (the Privacy Act of
7 1974). This paragraph shall not affect the availability of
8 data provided to the Department under any other provi-
9 sion of law administered by the Department. The con-
10 fidentiality provisions of other statutes authorizing the col-
11 lection of environmental statistics shall also apply, includ-
12 ing but not limited to, section 14 of the Toxic Substances
13 Control Act (15 U.S.C. 2613), section 2(h) of the Federal
14 Insecticide, Fungicide, and Rodenticide Act (7 U.S.C.
15 136h), section 114(c) of the Clean Air Act (42 U.S.C.
16 741(c)), and section 1905 of title 18, United States Code.

17 (b) DIRECTOR OF ENVIRONMENTAL STATISTICS.—
18 The Bureau shall be under the direction of a Director of
19 Environmental Statistics (hereafter referred to as the “Di-
20 rector”) who shall be appointed by the President, by and
21 with the advice and consent of the Senate. The term of
22 the Director shall be 4 years. The Director shall be a
23 qualified individual with experience in the compilation and
24 analysis of environmental statistics. The Director shall re-
25 port directly to the Secretary. The Director shall be com-

1 pensated at the rate provided for at level V of the Execu-
2 tive Schedule under section 5316 of title 5, United States
3 Code.

4 (c) ENVIRONMENTAL STATISTICS ANNUAL RE-
5 PORT.—On January 1, 1992, and each January 1 there-
6 after, the Director shall submit to the President an Envi-
7 ronmental Statistics Annual Report (hereafter referred to
8 as the “Report”). The Report shall include, but not be
9 limited to—

10 (1) statistics on environmental quality
11 including—

12 (A) The environmental quality of the Na-
13 tion with respect to all aspects of the environ-
14 ment, including, but not limited to, the air,
15 aquatic ecosystems, including marine, estuarine,
16 and fresh water, and the terrestrial ecosystems,
17 including, but not limited to, the forest, dry-
18 land, wetland, range, urban, suburban, and
19 rural environment; and

20 (B) changes in the natural environment,
21 including the plant and animal systems, and
22 other information for a continuing analysis of
23 these changes or trends and an interpretation
24 of their underlying causes;

1 (2) statistics on the effects of changes in envi-
2 ronmental quality on human health and nonhuman
3 species and ecosystems;

4 (3) documentation of the method used to obtain
5 and assure the quality of the statistics presented in
6 the Report;

7 (4) economic information on the current and
8 projected costs and benefits of environmental protec-
9 tion; and

10 (5) recommendations on improving environ-
11 mental statistical information.

12 (d) CONTINUING PERFORMANCE OF THE FUNCTIONS
13 OF THE DIRECTOR PENDING CONFIRMATION.—An indi-
14 vidual who, on the effective date of this Act, is performing
15 any of the functions required by this section to be per-
16 formed by the Director may continue to perform such
17 functions until such functions are assigned to an individ-
18 ual appointed as the Director under this Act.

19 (e) ADVISORY COUNCIL ON ENVIRONMENTAL STA-
20 TISTICS.—The Director shall appoint an Advisory Council
21 on Environmental Statistics, comprised of no more than
22 6 private citizens who have expertise in environmental sta-
23 tistics and analysis (except that at least one of such ap-
24 pointees should have expertise in economics) to advise the
25 Director on environmental statistics and analyses, includ-

1 ing whether the statistics and analyses disseminated by
2 the Bureau are of high quality and are based upon the
3 best available objective information. The Council shall be
4 subject to the provisions of the Federal Advisory Commit-
5 tee Act.

6 (f) BUREAU AUTHORIZATION OF APPROPRIATIONS.—

7 There are authorized to be appropriated \$5,400,000 in fis-
8 cal year 1993, \$5,400,000 in fiscal year 1994, and such
9 sums as necessary in each fiscal year thereafter to carry
10 out the provisions of this section.

11 **SEC. 109. GRANT AND CONTRACT AUTHORITY FOR CER-**
12 **TAIN ACTIVITIES.**

13 The Secretary may make grants to and enter into
14 contracts with State and local governments to assist them
15 in meeting the costs of collecting specific data and other
16 short-term activities that are related to the responsibilities
17 and functions under section 108(a)(1) (A), (B), (C), and
18 (D).

19 **SEC. 110. STUDY OF DATA NEEDS.**

20 (a) STUDY OF DATA NEEDS.—(1) No later than 1
21 year after the start of Bureau operations, the Secretary
22 of the Department of Environment, in consultation with
23 the Director of the Bureau and the Assistant Secretary
24 designated as Chief Information Resources Officer, shall
25 enter into an agreement with the National Academy of

1 Sciences for a study, evaluation, and report on the ade-
2 quacy of the data collection procedures and capabilities of
3 the Department. No later than 18 months following an
4 agreement, the National Academy of Sciences shall report
5 its findings to the Secretary and the Congress. The report
6 shall include an evaluation of the Department's data col-
7 lection resources, needs, and requirements, and shall in-
8 clude an assessment and evaluation of the following sys-
9 tems, capabilities, and procedures established by the De-
10 partment to meet those needs and requirements:

11 (A) data collection procedures and capabilities;

12 (B) data analysis procedures and capabilities;

13 (C) the ability of data bases to integrate with
14 one another;

15 (D) computer hardware and software capabili-
16 ties;

17 (E) management information systems, including
18 the ability of management information systems to
19 integrate with another;

20 (F) Department personnel; and

21 (G) the Department's budgetary needs and re-
22 sources for data collection, including an assessment
23 of the adequacy of the budgetary resources provided
24 to the Department and budgetary resources used

1 by the Department for data collection needs and
2 purposes.

3 (2) The report shall include recommendations for im-
4 proving the Department's data collection systems, capa-
5 bilities, procedures, data collection, and analytical hard-
6 ware and software, and for improving its management in-
7 formation systems.

8 (b) AUTHORIZATION OF APPROPRIATIONS.—There
9 are authorized to be appropriated such sums as necessary
10 to carry out the provisions of this section.

11 **SEC. 111. MISCELLANEOUS EMPLOYMENT RESTRICTIONS.**

12 (a) PROHIBITED EMPLOYMENT AND ADVANCEMENT
13 CONSIDERATIONS.—Except as otherwise provided in this
14 Act, political affiliation or political qualification may not
15 be taken into account in connection with the appointment
16 of any person to any position in the career civil service
17 or in the assignment or advancement of any career civil
18 servant in the Department.

19 (b) REPORTS ON IMPLEMENTATION.—One year after
20 the date of the enactment of this title and again 3 years
21 after the date of the enactment of this title, the Secretary
22 shall report to the Senate Committees on Appropriations,
23 Governmental Affairs, and Environment and Public
24 Works and to the House of Representatives on the esti-
25 mated additional cost of implementing this title over the

1 cost as if this title had not been implemented, including
2 a justification of increased staffing not required in the exe-
3 cution of this title.

4 **SEC. 112. ADMINISTRATIVE PROVISIONS.**

5 (a) **ACCEPTANCE OF MONEY AND PROPERTY.—(1)**
6 The Secretary may accept and retain money, uncompen-
7 sated services, and other real and personal property or
8 rights (whether by gift, bequest, devise, or otherwise) for
9 the purpose of carrying out the Department's programs
10 and activities, except that the Secretary shall not endorse
11 any company, product, organization, or service. Gifts, be-
12 quests, and devises of money and proceeds from sales of
13 other property received as gifts, bequests, or devises shall
14 be credited in a separate fund in the Treasury of the Unit-
15 ed States and shall be available for disbursement upon the
16 order of the Secretary.

17 (2) The Secretary shall prescribe regulations and
18 guidelines setting forth the criteria the Department shall
19 use in determining whether to accept a gift, bequest, or
20 devise. Such criteria shall take into consideration whether
21 the acceptance of the property would reflect unfavorably
22 upon the Department's or any employee's ability to carry
23 out its responsibilities or official duties in a fair and objec-
24 tive manner, or would compromise the integrity of or the

1 appearance of the integrity of a Government program or
2 any official involved in that program.

3 (b) SEAL OF THE DEPARTMENT.—(1) On the effec-
4 tive date of this Act, the seal of the Environmental Protec-
5 tion Agency with appropriate changes shall be the seal of
6 the Department of the Environment, until such time as
7 the Secretary may cause a seal of office to be made for
8 the Department of the Environment of such design as the
9 Secretary shall approve.

10 (2) CRIMINAL PENALTY FOR UNAUTHORIZED USE OF
11 SEAL.—(A) Chapter 33 of title 18, United States Code,
12 is amended by adding at the end thereof the following new
13 section:

14 **“§ 716. Department of the Environment Seal**

15 “(a) Whoever knowingly displays any printed or other
16 likeness of the official seal of the Department of the Envi-
17 ronment, or any facsimile thereof, in, or in connection
18 with, any advertisement, poster, circular, book, pamphlet,
19 or other publication, public meeting, play, motion picture,
20 telecast, or other production, or on any building, monu-
21 ment, or stationery, for the purpose of conveying, or in
22 a manner reasonably calculated to convey, a false impres-
23 sion of sponsorship or approval by the Government of the
24 United States or by any department, agency, or instru-

1 mentality thereof, shall be fined not more than \$250 or
2 imprisoned not more than 6 months, or both.

3 “(b) Whoever, except as authorized under regulations
4 promulgated by the Secretary of the Environment and
5 published in the Federal Register, knowingly manufac-
6 tures, reproduces, sells, or purchases for resale, either sep-
7 arately or appended to any article manufactured or sold,
8 any likeness of the official seal of the Department of the
9 Environment, or any substantial part thereof, except for
10 manufacture or sale of the article for the official use of
11 the Government of the United States, shall be fined not
12 more than \$250 or imprisoned not more than 6 months,
13 or both.

14 “(c) A violation of subsection (a) or (b) may be en-
15 joined at the suit of the Attorney General of the United
16 States upon complaint by any authorized representative
17 of the Secretary of the Department of the Environment.”.

18 (B) The table of sections for chapter 33 of title 18,
19 United States Code, is amended by adding at the end
20 thereof:

“716. Department of the Environment Seal.”.

21 (c) ACQUISITION OF COPYRIGHTS AND PATENTS.—
22 The Secretary is authorized to acquire any of the following
23 described rights if the property acquired thereby is for use
24 by or for, or useful to, the Department:

(1) copyrights, patents, and applications for patents, designs, processes, and manufacturing data;

(2) licenses under copyrights, patents, and applications for patents; and

(3) releases, before suit is brought, for past infringement of patents or copyrights.

(d) **ADVISORY COMMITTEE STANDARDS OF CONDUCT AND COMPENSATION.**—The Secretary may promulgate regulations, no less stringent than any other applicable provision of law, regarding standards of conduct for members of advisory committees (and consultants to advisory committees), including requirements regarding conflicts of interest or disclosure of past and present financial and employment interests. The Secretary is authorized to pay members of advisory committees and others who perform services as authorized under section 3109 of title 5, United States Code, at rates for individuals not to exceed the per diem rate equivalent to the rate for level V of the Executive Schedule under section 5316 of title 5, United States Code.

SEC. 113. INHERENTLY GOVERNMENTAL FUNCTIONS.

(a) **GOVERNMENT OFFICERS AND EMPLOYEES.**—(1) Inherently governmental functions of the Department shall be performed only by officers and employees of the United States. For purposes of this section, “inherently

1 governmental” means any activity which is so intimately
2 related to the public interest as to mandate performance
3 by Government officers and employees. These inherently
4 governmental functions include those activities which re-
5 quire either the exercise of discretion in applying Govern-
6 ment authority or the use of value of judgment in making
7 decisions for the Government. These functions shall in-
8 clude, but not be limited to, work of a policy, decisionmak-
9 ing, or managerial nature which is the direct responsibility
10 of Department officials.

11 (b) CONFLICTS OF INTEREST.—(1) The Secretary
12 shall by regulation require any person proposing to enter
13 into a contract, agreement, or other arrangement, whether
14 by competitive bid or negotiation, for the conduct of re-
15 search, development, evaluation activities, or for advisory
16 and assistance services, to provide the Secretary, prior to
17 entering into any such contract, agreement, or arrange-
18 ment, with all relevant information, as determined by the
19 Secretary, bearing on whether that person has a possible
20 conflict of interest with respect to—

21 (A) being able to render impartial, technically
22 sound, or objective assistance or advice in light of
23 other activities or relationships with other persons;
24 or

1 (B) being given an unfair competitive advantage.
2

3 (2) Such person shall ensure, in accordance with regulations prescribed by the Secretary, compliance with this
4 section by subcontractors of such person who are engaged
5 to perform similar services.
6

7 (c) REQUIRE AFFIRMATIVE FINDING; CONFLICTS OF
8 INTEREST WHICH CANNOT BE AVOIDED; MITIGATION OF
9 CONFLICTS.—(1) Subject to the provisions of paragraph
10 (2), the Secretary may not enter into any such contract,
11 agreement, or arrangement, unless he affirmatively finds,
12 after evaluating all such information and any other relevant
13 information otherwise available to him, either that—

14 (A) there is little or no likelihood that a conflict
15 of interest would exist; or

16 (B) that such conflict has been avoided after
17 appropriate conditions have been included in such
18 contract, agreement, or arrangement.

19 (2) If the Secretary determines that such conflict of
20 interest exists and that such conflict of interest cannot be
21 avoided by including appropriate conditions therein, the
22 Secretary may enter into such contract, agreement, or arrangement,
23 if he—

24 (A) determines that it is in the best interests of
25 the United States to do so; and

1 (B) includes appropriate conditions in such con-
2 tract, agreement, or arrangement to mitigate such
3 conflict.

4 (d) PUBLIC NOTICE REGARDING CONFLICTS OF IN-
5 TEREST.—The Secretary shall promulgate regulations
6 which require public notice to be given whenever the Sec-
7 retary determines that the award of a contract, agreement,
8 or arrangement may result in a conflict of interest which
9 cannot be avoided by including appropriate conditions
10 therein.

11 (e) DISCLAIMER.—Nothing in this section shall pre-
12 clude the Department from promulgating regulations to
13 monitor potential conflicts after the contract award.

14 (f) RULES.—No later than 30 days after the effective
15 date of this Act, the Secretary shall publish rules for the
16 implementation of this section.

17 (g) CENTRAL FILE.—The Department shall maintain
18 a central file regarding all cases when a public notice is
19 issued. Other information required under this section shall
20 also be compiled. Access to this information shall be con-
21 trolled to safeguard any proprietary information.

22 (h) DEFINITIONS.—For purposes of this section, the
23 term “advisory and assistance services” includes—

24 (1) management and professional support serv-
25 ices;

1 (2) the conduct of studies, analyses, and evalua-
2 tions; and

3 (3) engineering and technical services, excluding
4 routine technical services.

5 **SEC. 114. REFERENCES.**

6 Reference in any other Federal law, Executive order,
7 rule, regulation, or delegation of authority, or any docu-
8 ment of or pertaining—

9 (1) to the Administrator of the Environmental
10 Protection Agency shall be deemed to refer to the
11 Secretary of the Environment;

12 (2) to the Environmental Protection Agency
13 shall be deemed to refer to the Department of the
14 Environment;

15 (3) to the Deputy Administrator of the Envi-
16 ronmental Protection Agency shall be deemed to
17 refer to the Deputy Secretary of the Environment;
18 or

19 (4) to any Assistant Administrator of the Envi-
20 ronmental Protection Agency shall be deemed to
21 refer to an Assistant Secretary of the Department of
22 the Environment.

23 **SEC. 115. SAVINGS PROVISIONS.**

24 (a) CONTINUING EFFECT OF LEGAL DOCUMENTS.—

25 All orders, determinations, rules, regulations, permits,

1 agreements, grants, contracts, certificates, licenses, reg-
2 istrations, privileges, and other administrative actions—

3 (1) which have been issued, made, granted, or
4 allowed to become effective by the President, by the
5 Administrator of the Environmental Protection
6 Agency, or by a court of competent jurisdiction, in
7 the performance of functions of the Administrator or
8 the Environmental Protection Agency, and

9 (2) which are in effect at the time this Act
10 takes effect, or were final before the effective date
11 of this Act and are to become effective on or after
12 the effective date of this Act,

13 shall continue in effect according to their terms until
14 modified, terminated, superseded, set aside, or revoked in
15 accordance with law by the President, the Secretary of the
16 Environment, or other authorized official, a court of com-
17 petent jurisdiction, or by operation of law.

18 (b) PROCEEDINGS NOT AFFECTED.—The provisions
19 of this Act shall not affect any proceedings or any applica-
20 tion for any license, permit, certificate, or financial assist-
21 ance pending before the Environmental Protection Agency
22 at the time this Act takes effect, but such proceedings and
23 applications shall be continued. Orders shall be issued in
24 such proceedings, appeals shall be taken therefrom, and
25 payments shall be made pursuant to such orders, as if this

1 Act had not been enacted, and orders issued in any such
2 proceedings shall continue in effect until modified, termi-
3 nated, superseded, or revoked by a duly authorized official,
4 by a court of competent jurisdiction, or by operation of
5 law. Nothing in this subsection shall be deemed to prohibit
6 the discontinuance or modification of any such proceeding
7 under the same terms and conditions and to the same ex-
8 tent that such proceeding could have been discontinued
9 or modified if this Act had not been enacted.

10 (c) SUITS NOT AFFECTED.—The provisions of this
11 Act shall not affect suits commenced before the date this
12 Act takes effect, and in all such suits, proceedings shall
13 be had, appeals taken, and judgments rendered in the
14 same manner and with the same effect as if this Act had
15 not been enacted.

16 (d) NONABATEMENT OF ACTIONS.—No suit, action,
17 or other proceeding commenced by or against the Environ-
18 mental Protection Agency, or by or against any individual
19 in the official capacity of such individual as an officer of
20 the Environmental Protection Agency, shall abate by rea-
21 son of the enactment of this Act.

22 (e) ADMINISTRATIVE ACTIONS RELATING TO PRO-
23 MULGATION OF REGULATIONS.—Any administrative ac-
24 tion relating to the preparation or promulgation of a regu-
25 lation by the Environmental Protection Agency may be

1 continued by the Department with the same effect as if
2 this Act had not been enacted.

3 (f) **PROPERTY AND RESOURCES.**—The contracts, li-
4 abilities, records, property, and other assets and interests
5 of the Environmental Protection Agency shall, after the
6 effective date of this Act, be considered to be the con-
7 tracts, liabilities, records, property, and other assets and
8 interests of the Department.

9 (g) **SAVINGS.**—The Department of the Environment
10 and its officers, employees, and agents shall have all the
11 powers and authorities of the Environmental Protection
12 Agency.

13 **SEC. 116. CONFORMING AMENDMENTS.**

14 (a) **PRESIDENTIAL SUCCESSION.**—Section 19(d)(1)
15 of title 3, United States Code, is amended by inserting
16 before the period at the end thereof the following: “, Sec-
17 retary of the Environment”.

18 (b) **DEFINITION OF DEPARTMENT, CIVIL SERVICE**
19 **LAWS.**—Section 101 of title 5, United States Code, is
20 amended by adding at the end thereof the following: “The
21 Department of the Environment”.

22 (c) **COMPENSATION, LEVEL I.**—Section 5312 of title
23 5, United States Code, is amended by adding at the end
24 thereof the following: “Secretary of the Environment”.

1 (d) COMPENSATION, LEVEL II.—Section 5313 of title
2 5, United States Code, is amended by striking out “Ad-
3 ministrator of Environmental Protection Agency” and in-
4 serting in lieu thereof “Deputy Secretary of the Environ-
5 ment”.

6 (e) COMPENSATION, LEVEL IV.—Section 5315 of
7 title 5, United States Code, is amended—

8 (1) by striking out “Inspector General, Envi-
9 ronmental Protection Agency” and inserting in lieu
10 thereof “Inspector General, Department of the Envi-
11 ronment”; and

12 (2) by striking each reference to an Assistant
13 Administrator of the Environmental Protection
14 Agency and by adding at the end thereof the follow-
15 ing: “Assistant Secretaries, Department of the Envi-
16 ronment (10). “General Counsel, Department of the
17 Environment.”.

18 (f) COMPENSATION, LEVEL V.—Section 5316 of title
19 5, United States Code, is amended by adding at the end
20 thereof the following:

21 “Director of the Bureau of Environmental Sta-
22 tistics, Department of the Environment.

23 “Executive Director of the Commission on Im-
24 proving Environmental Protection.”.

1 (g) INSPECTOR GENERAL ACT.—The Inspector Gen-
2 eral Act of 1978 is amended—

3 (1) in section 2(1)—

4 (A) by inserting “the Department of the
5 Environment,” after “Veterans Affairs,”; and

6 (B) by striking out “The Environmental
7 Protection Agency,”;

8 (2) in section 11(1) by striking out “or Veter-
9 ans Affairs” and inserting “Veterans Affairs, or the
10 Environment,”; and

11 (3) in section 11(2) by striking out “or Veter-
12 ans Affairs” and inserting “Veterans Affairs, or the
13 Environment,”.

14 **SEC. 117. ADDITIONAL CONFORMING AMENDMENTS.**

15 After consultation with the Committee on Govern-
16 mental Affairs and the Committee on Environment and
17 Public Works and other appropriate committees of the
18 United States Senate and the appropriate committees of
19 the House of Representatives, the Secretary of the Envi-
20 ronment shall prepare and submit to the Congress pro-
21 posed legislation containing technical and conforming
22 amendments to the United States Code, and to other pro-
23 visions of law, to reflect the changes made by this Act.
24 Such legislation shall be submitted not later than 6
25 months after the effective date of this Act.

1 **TITLE II—ENVIRONMENTAL**
2 **ROLE OF THE UNITED STATES**
3 **IN INTERNATIONAL ORGANI-**
4 **ZATIONS TO WHICH IT BE-**
5 **LONGS**

6 **SEC. 201. INTERNATIONAL ENERGY CONFERENCE.**

7 The Secretary of State, in consultation with the Sec-
8 retary of Energy and the Secretary of the Environment,
9 and with the advice of the Committee on Earth and Envi-
10 ronmental Sciences, is authorized and strongly urged to
11 convene an international meeting to be held in the United
12 States with invitations to representatives of all countries
13 of the world, the purpose of which shall be to encourage
14 the exchange of information concerning energy efficiency
15 and renewable energy resources that are environmentally
16 acceptable and ecologically sustainable.

17 **SEC. 202. INTERNATIONAL GREENHOUSE GAS MONITORING**
18 **PROGRAM.**

19 The President, with the advice of the Committee on
20 Earth and Environmental Sciences, shall encourage the
21 establishment of an office of the United Nations Environ-
22 ment Programme (UNEP) and the World Meteorological
23 Organization (WMO) to monitor annual estimated genera-
24 tion and removal of carbon dioxide and other trace gases
25 on a country-by-country basis.

1 **TITLE III—ESTABLISHMENT OF**
2 **THE COMMISSION ON IM-**
3 **PROVING ENVIRONMENTAL**
4 **PROTECTION**

5 **SEC. 301. ESTABLISHMENT; MEMBERSHIP.**

6 (a) **ESTABLISHMENT.**—There is established the Com-
7 mission on Improving Environmental Protection (here-
8 after referred to as “the Commission”) whose 13 members
9 including the Chairman shall be composed of experts in
10 governmental organization (with emphasis on environ-
11 mental organization), management of organizations and
12 environmental regulation and improved environmental
13 governmental service delivery, consisting of—

14 (1) seven members to be appointed by the
15 President;

16 (2) three members to be appointed by the
17 Speaker of the House; and

18 (3) three members to be appointed by the Sen-
19 ate Majority Leader.

20 (b) **CHAIRMAN.**—The Chairman of the Commission
21 shall be appointed by the President in consultation with
22 the Congress.

23 **SEC. 302. COMMISSION RESPONSIBILITIES.**

24 (a) **RESPONSIBILITIES.**—The Commission shall be
25 responsible for examining and making recommendations

1 on the management and implementation of the environ-
2 mental laws and programs within the jurisdiction of the
3 Department of the Environment in order to enhance the
4 ability of the Department to preserve and protect human
5 health and the environment. The Commission shall make
6 recommendations and otherwise advise the President and
7 the Congress on the need to—

8 (1) enhance and strengthen the management
9 and implementation of existing programs within the
10 Department;

11 (2) enhance the organization of the Department
12 to eliminate duplication and overlap between dif-
13 ferent programs;

14 (3) enhance the coordination between different
15 programs and offices within the Department; and

16 (4) enhance the consistency of policies through-
17 out the Department.

18 (b) RECOMMENDATIONS.—The Commission shall
19 provide specific steps and proposals for implementing the
20 Commission's recommendations including an estimate of
21 the costs of implementing such recommendations, except
22 that the Commission shall not suggest substantive changes
23 in the policy expressed by existing laws.

1 **SEC. 303. REPORT TO THE PRESIDENT AND CONGRESS.**

2 The Commission shall report to the President and the
3 Congress on its investigation, findings, and recommenda-
4 tions in an interim report no later than 12 months after
5 the effective date of this title, and in a final report no
6 later than 24 months after the effective date of this title.
7 The interim report shall be made available for public re-
8 view and comment, and the comments taken into account
9 in finalizing the report.

10 **SEC. 304. COMMISSION STAFF.**

11 The Commission shall appoint an Executive Director
12 who shall be compensated at a rate not to exceed the rate
13 of basic pay prescribed for level V of the Executive Sched-
14 ule under section 5316 of title 5, United States Code.
15 With the approval of the Commission the Executive Direc-
16 tor may appoint and fix the compensation of staff suffi-
17 cient to enable the Commission to carry out its duties.

18 **SEC. 305. ADVISORY GROUPS.**

19 The Chairman shall convene at least one advisory
20 group to assist the Commission in developing its rec-
21 ommendations. One advisory group shall be composed of
22 past staff of the Department of the Environment and its
23 predecessor Environmental Protection Agency, other Fed-
24 eral and State officials experienced in administering envi-
25 ronmental protection programs, members of the regulated
26 community and members of public interest groups orga-

1 nized to further the goals of environmental protection. The
2 Executive Director is authorized to pay members of advisory
3 sory committees and others who perform services as authorized
4 thORIZED under section 3109 of title 5, United States Code,
5 at rates for individuals not to exceed the per diem rate
6 equivalent to the rate for level V of the Executive Schedule
7 under section 5316 of title 5, United States Code. The
8 advisory group shall be subject to the provisions of the
9 Federal Advisory Committee Act.

10 **SEC. 306. FUNDING; AUTHORIZATION OF APPROPRIATIONS.**

11 There are authorized to be appropriated \$5,000,000
12 in fiscal year 1993 and \$5,000,000 in fiscal year 1994
13 to carry out the provisions of this title.

14 **TITLE IV—EFFECTIVE DATE**

15 **SEC. 401. EFFECTIVE DATE.**

16 This Act and the amendments made by this Act shall
17 take effect on such date during the 6-month period beginning
18 on the date of enactment, as the President may direct
19 in an Executive order. If the President fails to issue an
20 Executive order for the purpose of this section, this Act
21 and such amendments shall take effect 6 months after the
22 date of the enactment of this Act.

O

PREPARED STATEMENT OF CAROL M. BROWNER

I am honored to testify before you today in support of creating a Cabinet Department on the environment, and to confirm this Administration's commitment to improving environmental quality. I commend the leadership this Committee has demonstrated in pursuing this matter. The Administration supports elevation of EPA to a Cabinet Department and will provide to the Committee suggested technical corrections to S. 171 in the near future.

Environmental quality is inextricably linked to our Nation's and the world's hopes for a better quality of life. Public concern about the environment drives our need to consider how all of our policies affect quality of life for ourselves and our children.

We all share a strong commitment to the environment. However, without an adequate institutional framework, even principled commitment can be rendered abstract. The question is not whether to create a Department on the environment, but when. The answer is now, at the beginning of this nation's third decade of Federal environmental protection. A decade in which we will move from command and control, media-specific regulation to alternative approaches oriented toward pollution prevention, ecosystem protection, and incentive-based policies. It is time for a Department on the environment to function as a permanent and equal partner in the President's Cabinet, integral to any equation of Federal decisionmaking.

1993 is a pivotal point in time. We have the opportunity now to establish an environmental infrastructure ready to meet the challenges of the 21st century. We must move "upstream" and examine individual pollution sources as elements of larger systems. Preventing pollution by elimination or reduction of waste at the source is key to this Administration's commitment to providing a healthy economy that meets our needs today while preserving the environment for our children and future generations to enjoy.

A Cabinet Department on the environment will be well-positioned to accelerate efforts to integrate pollution prevention and multi-media decisionmaking into regulatory and compliance programs Government-wide, to promote the use of incentive-based policies, to improve technical assistance to small business, and to encourage corporate commitment to clean manufacturing processes and green products through innovative programs. A Cabinet that includes an environment Department will ensure that the environment is fully engaged and integrated into the President's examination of and decisions on national issues.

Likewise, EPA's international environmental programs provide cooperation with and technical expertise to developing and newly democratic countries and our industrialized partners. Cabinet status will be important in making the head of EPA a peer with Cabinet colleagues in foreign environment ministries and promoting international cooperation on the environment. It will also make EPA a more effective collaborator with other Cabinet Departments involved in international environmental activities, including UNCED followup, programs in Central and Eastern Europe and the former Soviet Union, and environmental cooperation with Mexico.

In the past 20 years this country created most of our existing environmental infrastructure and body of law. To be sure, the National debate among Federal, state, local, and tribal governments, industry, and the public on environmental matters has not always been successful. Nevertheless, significant progress has been achieved. The air, water, and land are demonstrably cleaner as a result of our joint efforts. Our "command and control" approach has worked well but has tended to focus on a relatively small number of large point sources of pollution. In addition its limited scope ignores creative opportunities in terms of pollution prevention and ecosystem approaches.

The facts show that we have had tangible successes in some areas, that we are learning to better anticipate and meet new challenges, and that our successes depend very much on cooperation among the parties: governments, business, and the public. Yet, our many environmental successes sometimes seem dwarfed by the growing agenda of environmental challenges both domestic and international.

In 1993, concern for the environment affects individual, corporate, and governmental behavior. The environmental ethic has evolved and is taken seriously across economic, cultural, geographic, and governmental sectors. Just as civil rights issues gripped our nation in the 60's, and nuclear/cold war concerns dominated the 70's and 80's, integration of economic and environmental policy has seized the public's attention in the 90's. A 1992 Roper/Johnson poll on environmental behavior indicated that 60% of the population of North America is concerned about the environment. A 1992 survey conducted for the World Wildlife Fund by Peter D. Hart Re-

search Associates found that America's youth are among the most environmentally conscious and concerned segment of our population.

We now understand that we live in an enormously complex global ecosystem: "solving" one environmental problem can create a new one. Clean-up of surface water has contaminated ground water and solutions to ground pollution have polluted the air. Actions taken by one country can affect the health of the citizens of another, thousands of miles away, and for generations to come. We also know that assessment of environmental achievement is a relative measure: our "successes" are meaningful only in terms of reducing overall risk. We have learned that we must not limit ourselves to clean-up, but must also seek to prevent pollution at the source. We must adopt a comprehensive and understanding approach that avoids unintended consequences of our actions and decisions. We must force ourselves to address long-term and not just short-term consequences.

The 80's have shown us that environmental action or inaction has economic consequences, in turn affecting our environmental and business choices in a never ending cycle of cause-and-effect. Environmental opportunities can be economic opportunities. Money spent by companies to comply with environmental laws and regulations translates into revenues and jobs for other American businesses. For example, the Clean Air Act Amendments are the latest example of how Congressional and EPA action can drive major economic growth in the pollution control sector.

This Administration is committed to identifying the dynamic relationship between economic and environmental needs and to ensuring that environmental assets are reflected in our accounting of national well-being. Environmental protection and economic growth are not incompatible. The Roper Organization's 1992 Green Gauge Poll showed that a strong majority (63%) of Americans believe economic development and environmental protection go hand in hand.

EPA is evolving as an institution grappling with today's challenges, but the EPA created by Reorganization Plan Number 3 in 1970 is positioned now to function as more than a regulatory agency. This Administration embraces successful new approaches and the essential dynamic of environmental management handled in partnership across Department and governmental lines. An environment Department must work closely with both its Cabinet counterparts and its state, local, tribal, and other government partners, and remain responsive to the individual citizen. We must rely carefully on sound science and research to better understand environmental issues such as biodiversity, global climate change, environmental equity, risk, and persistent toxic chemicals, and to better develop policy and solutions. An environment Department must be a model environmental steward both domestically and internationally. The Department must also serve as a model for responsible fiscal practices and responsive, accountable management. Financial integrity and sound contract management are critical to fulfilling our environmental mission and to safeguarding the taxpayer's dollar.

Environmental protection is not a mere footnote, but encompasses all of the Earth's resources and human activity. It is front-page, banner-headline news woven throughout newspapers, scientific and medical journals, and business and law publications. It shapes our daily thinking, strategies, and budgets in every conceivable issue area. We are moving beyond thinking of environmental quality as a luxury or as a hindrance to economic growth. The growth of our economy depends on the availability of a clean, safe environment and the long-term availability of natural resources. We can best join the need for balancing growth and the environment by unleashing American ingenuity and creativity to revive our economy and create a new generation of environmental technology—which will make us more competitive in a fast-growing international marketplace.

Both our national environmental ethic and the nature of the ecosystem itself tell us that the President's Cabinet currently is incomplete. In today's world a successful strategy for any public policy issue requires a holistic perspective that crosses traditional Department boundaries. There is virtually no such thing as a policy or problem that does not have environmental aspects or that is simply "environmental." A sound approach to the environment is essential to the success and sustainability of our Nation's economic, social, and trade policies. The President's Cabinet must be able to function as a collaborative and interdependent mechanism, integrating the best public policy thinking across Department lines. It is not enough that environmental considerations be part of Cabinet discussions: the environment must be there in its own right as an equal priority and member.

Our experience over the last few weeks in fashioning the President's economic plan is illustrative of the role that environmental considerations should play in our Federal decisionmaking process. As the numerous options for energy taxes were ex-

plored, environmental concerns and impacts were analyzed in a matrix alongside energy, economic, social, and trade considerations.

Any student of democracy and public policy must acknowledge a missing building block in the list of structures in the top tier of the Federal Government. Currently, EPA sits in the Cabinet room at the President's invitation but President Clinton agrees that we should validate its presence as a statutory matter regardless of who sits in the White House Oval Office. It is time for a permanent chair at the table, institutionalizing the environment as a critical ingredient in the mix of any Federal decisionmaking.

As our children, pre-kindergarten through college, study the structures that define our democracy and government, I want to make sure that an environment Department is part of their original understanding of what makes our Nation strong. In addition to our children, students of democracy everywhere in the world should comprehend that an environment Department is key to America's identity. The United States should join the majority of our major partners who count an environment minister as an equal among the top government tier. Not to do so sends the wrong message about our government's priorities here at home; it also prevents us from asserting the kind of leadership that the rest of the world is looking to us to provide on environmental problems affecting the entire planet.

In conclusion, I assure you that I believe the creation of an environment Cabinet Department means more than a new chair. Joining the Cabinet ensures direct access to the President, and, consequently, a voice on behalf of citizens concerned about the environment their children will inherit and industry seeking to mesh environmental and business concerns. An environment Department's involvement in the Federal Government's domestic and international agenda will improve the quality and efficiency of Federal decisionmaking as the Cabinet addresses all of the Nation's challenges.

Finally, creation of an environmental Department signals at home and abroad the highest commitment of the United States to environmental stewardship. As public officials we must judge ourselves not only by what we accomplish today, but by the legacy we create for tomorrow. S. 171 is consistent with President Clinton's three-part environmental framework: elevation of EPA to a Cabinet Department, elimination of the Council on Environmental Quality and reassignment of its functions, and creation of an Office on Environmental Policy in the White House.

PREPARED STATEMENT OF DOUGLAS M. COSTLE

Mr. Chairman and members of the Committee, I appreciate the opportunity to appear here this morning to testify in favor of establishing a Department of the Environment. At the outset, I would like to present to you and submit for the record a letter from five former EPA Administrators indicating our strong support for a Department. I congratulate you and your colleagues for spearheading this effort and for your continuing leadership in protecting the environment and public health.

As you know, I supported S. 2006 and testified before your committee on its merits 2 years ago. I enthusiastically support S. 171. Over the past 2 years I have served as a member of two commission groups that have examined a broad range of environmental policy issues. Participating in the activities of the National Commission on the Environment and the Carnegie Commission on Science, Technology, and Government has given me an opportunity to reflect on our nation's past environmental record and the challenges we face in the years ahead.

My serious interest in Federal organization with respect to the environment began in 1969, when I directed the Ash Council study that led to the establishment of the Environmental Protection Agency. Since that time the Nation has made considerable progress in protecting the environment, but we are clearly in the early stages of a long journey, and I believe establishing a Department is a critical step in paving the way to the future. Fortunately, the concept of a Department of the Environment has bipartisan congressional support and has been endorsed by the Administration. With President Clinton and Vice President Gore's commitment to environmental protection, I believe this is an opportune time to look broadly at the organization of the Federal Government in this area and examine other potential improvements as well.

In his 1961 address at the dedication ceremony of the National Wildlife Federation building, President John F. Kennedy eloquently stated the ultimate purpose of our environmental protection efforts. He said, "It is our task in our time and our

generation to hand down undiminished to those who come after us, as was handed to us by those who went before, the natural wealth and beauty which is ours. "This is really another way of stating the goal of sustainable development, a term that has gained popular usage since the Brundtland Commission's 1987 report, *Our Common Future*, and the Earth Summit of last summer.

Federal Organizational Changes Are Needed Now

What is the responsibility of the United States in furthering the objective of sustainable development while protecting public health? Twenty years ago most of EPA's efforts were directed to problems within our own borders such as clean air and water. Today we are still working on these goals, but the Nation and the world are facing additional and even more complex problems such as stratospheric ozone depletion, climate change, and the loss of biodiversity. Environmental policy makers are also increasingly concerned about the more subtle health and ecological risks posed by a broad range of toxic substances at relatively low levels. Unfortunately, our Federal efforts are organized in the context of the problems of the past, not the problems of today and the anticipated challenges of the future.

Some may question the usefulness of expending time, resources, and political capital on organizational and procedural reforms. One can point to occasions in the past when government officials have devoted considerable resources to developing and trying to implement organizational proposals to no avail, but there are also instances in which inattention to organization and decisionmaking processes has impeded and continues to undermine the Federal Government's ability to respond to societal needs. I think we are in the latter situation now with respect to environmental protection.

The Federal Government is simply not organized to respond to the problems facing the Nation and the world. And the failure to align government programs to address these problems effectively will continue to restrict our capacity to respond to them. Public health, environmental quality, and economic performance are all at risk unless we take decisive steps and develop a strategy that improves our national capacity to respond to the challenges facing us. We need to make substantial organizational and procedural changes if the United States is to achieve its domestic goals and provide leadership in furthering international efforts to protect the global environment.

In considering organizational and procedural changes, we should take into account the evolution of our environmental policies. We are moving from a command and control regulatory strategy to a more economic incentive-based approach, from end-of-the pipe treatment to pollution prevention, from concern primarily about cancer-causing risks posed by toxic substances to noncancer and ecological threats as well, and from directing our efforts mostly to problems within our national borders to international and global challenges.

A Two-Step Approach

I think Congress and the President should consider a two-step approach in building the organizational structures and decision-making processes the Federal Government will need to address the challenges we are facing. The provisions of S. 171 encompass most of the key elements of the first phase. EPA should be raised to a cabinet-level department, a Bureau of Environmental Statistics should be established, and a Commission on Improving Environmental Protection should be convened. These changes should be instituted quickly and should not be impeded by the consideration of a range of other important options for improving the organization of Federal environmental programs.

At the same time that a Department of the Environment is being established it is critically important that the President take steps to ensure that there is a strong capacity in the White House to assess environmental issues and develop policy. The President has already expressed his intention to replace the three-member Council on Environmental Quality with an Office of Environmental Policy and to coordinate environmental policy within the Federal Government. I am not sure of the details of the President's proposal, but the concept of an office appears to be a good start. As the President apparently recognizes, there is a compelling need to integrate our new awareness of global environmental imperatives into a range of other important national priorities, including those dealing with energy, transportation, agriculture, industrial renewal, and national security.

Coordination is very important, but strategic planning, setting long-term goals, and providing guidance to Federal agencies is equally, or perhaps even more important. This latter set of activities is often neglected, and it will be a challenge for a small Office of Environmental Policy to do this.

White House leadership is needed in several areas. For example, the development of environmentally sound industrial technologies should be a national priority. Let's face it. Much of the thrust of our environmental efforts to date have been driven by the need to play "catch-up, clean-up." We have been preoccupied trying to clean up, after the fact, the polluting side effects of 20th-century technologies which were conceived largely in ignorance of their singular and cumulative environmental impacts. Today, as we approach the 21st century, we are on the verge of major changes in our industrial economy. Indeed, we have no choice but to reform if we are to maintain our stature as a principal player in a very competitive global economy. It would be a tragedy of enormous proportions if we fail to heed the lessons of this century as we approach the economic opportunities of the next; if we fail to shape the next generation of technology with an eye towards the long-term health of the global commons.

The United States should lead this new industrial reformation. The global market for green technologies is already large and growing. But, the United States must face the fact that it will take a set of calculated public policies if we are to stimulate the private investment needed to bring about this "greening" of technology.

There is also a manifest need to reduce our consumption of fossil fuels, both for environmental and national security reasons, and the new Energy Policy Act takes some important steps in the right direction, but there is much more we need to do in the areas of energy taxes and full-product pricing—incorporating the full costs of environmental degradation into the price tag of commercial products. Needless to say, the Office of Environmental Policy will be dealing with some of the most challenging policy questions facing the Nation and the world. I hope the President will put in place a first-rate, very experienced staff to carry out both the policy coordination and the strategic planning needs of the White House.

However, in my view it will be difficult for a small Office of Environmental Policy to generate the kind of integrated, long-range policies the Nation needs to advance initiatives of this kind.

The Need for a National Environmental Strategy

The Department of the Environment together with the Office of Environmental Policy and other departments and agencies should be responsible for developing a National Environmental Strategy, a blueprint for moving the Nation, and indeed the world, towards sustainable development and public health objectives. This was a key recommendation of the National Commission on the Environment, and I would like to submit a copy of the summary statement and key recommendations of the National Commission on the Environment report, *Choosing a Sustainable Future*, for the record.¹ Such a strategy should include explicit statements of the long-range and near-term environmental goals the Nation is working to achieve, and should state how progress in achieving them will be measured. The National Environmental Strategy should attempt to identify emerging problems and present a plan for responding to them.

In addition, I think Congress and the EPA Administrator should take a careful look at the organization of the agency's Office of Research and Development and consider consolidating its laboratories and developing a set of Environmental Research Institutes in order to upgrade the quality and extend the capacity of its research programs. Consideration should also be given to establishing a Federal inter-agency Environmental Technologies Program to coordinate Federal programs and ensure that mechanisms are in place to support the development and diffusion of these technologies in the private sector through grants, contracts, and cooperative agreements. These ideas are discussed in more detail in a report of the Carnegie Commission on Science, Technology, and Government, *Environmental R&D: Strengthening the Federal Infrastructure*,² which was released last December, and I would like to submit the executive summary of this report for the record as well. In this study we extend the idea of a National Environmental Strategy to include an Environmental Research and Monitoring Initiative, a long-term effort to bring all Federal environmental R&D programs into a common policy framework. There are a variety of other recommendations in this report and the National Commission on the Environment report that I hope you will have an opportunity to examine. I would be happy to provide interested members and staff complete copies of both reports.

This spring, the Carnegie Commission will release a second report on Federal regulatory decision-making that will present a series of suggestions for improving the way the Federal Government devises and implements policies to reduce risks to the environment and public health.³ I have provided your staff with a draft of this

report and I would be delighted to talk with you further about these issues in the months ahead.

The establishment of a Department of the Environment, the reinvigoration of a capacity in the White House to develop and coordinate environmental policy, and the enhancement of EPA's research programs are the major elements of what I referred to earlier as a useful first step in improving the organization of Federal programs.

Changes to Consider after Establishing a Department of the Environment

The second phase in improving the Federal Government's capacity to protect the environment and ensure sustainable development is in many respects even more important than the first. Once the Department is established, Congress and the President should agree on broader Federal organizational and decision-making initiatives. Let me briefly outline a few of the most significant changes that I think should be considered.

Our ability to protect the environment is strongly dependent upon our capacity to characterize the present state of the environment, assess the way it is changing in light of natural processes and human activities, and evaluate the effectiveness of environmental policies and programs. Our Carnegie Commission task force on environmental R&D came to the conclusion that the Federal Government should place its environmental surveying and monitoring activities under one roof and give these programs greater visibility. To accomplish this, we suggest that the National Oceanic and Atmospheric Administration (NOAA) be moved out of the Department of Commerce, where it is somewhat of an orphan, and that it be combined with the U.S. Geological Survey presently within Department of the Interior, to form a new Environmental Monitoring Agency (EMA). The EMA could be affiliated with a Department of the Environment or it could be an independent agency. Establishing an EMA within the Department is the preferred option in my view because it provides a linkage between our regulatory programs and our monitoring efforts, yet insulates them from the day-to-day regulatory activities of the Department.

The EMA would be responsible for surveying, monitoring, and regularly reporting on the quality of national and global air, land, and freshwater and ocean resources. This information will be very useful in developing the annual report on environmental quality which has been a responsibility of the Council on Environmental Quality and would contribute directly to the development and periodic revision of the National Environmental Strategy that we propose.

In the future it is critically important that we view our resources as a whole and develop policies with this broad perspective in mind. This will, for example, help us avoid the practice of simply moving pollution from one medium to another.

After a Department of the Environment is established, I also encourage Congress and the President to consider developing an organic statute for the Department that clearly states its mission and responsibilities, establishes a general organizational structure, authorizes a strong research and development program, assures a strategic planning capacity, and integrates science and risk analysis appropriately into the Department's activities. Ultimately, it is the proper application of sound science and innovative technology that enables us to meet our environmental protection goals.

Let me say in closing that I believe we have reached a critical point in the evolution of our nation's environmental policies. As we look to the future, we must be sure that we have the organizational structures and decision making procedures in place that will enable us to achieve the ambitious goals we are setting for ourselves. We simply do not have those structures and procedures in place now. As a first step, we need a Department of the Environment. As soon as this is accomplished, however, it is important that Congress and the President begin to consider a broader range of innovations.

Mr. Chairman, thank you again for inviting me to comment on your important legislative proposal. I hope that both Houses and the President will act upon it quickly.

REFERENCES

1. National Commission on the Environment, *Choosing a Sustainable Future*, Island Press, Washington, D.C., 1993. The general issue of setting long-term goals is also discussed in the Carnegie Commission on Science, Technology, and Government report, *Enabling the Future: Linking Science and Technology to Societal Goals*, released in September of 1992.

2. Carnegie Commission on Science, Technology, and Government, *Environmental Research and Development: Strengthening the Federal Infrastructure*, December 1992.

3. Carnegie Commission on Science, Technology, and Government, *New Frontiers in Regulatory Decision Making*. This report will be published this Spring.

(Copies of Carnegie Commission reports can be obtained by calling the Commission's Washington office at 202-332-2221.)

February 12, 1993

HON. JOHN GLENN
 United States Senate
 Washington, DC 20510

Dear Senator Glenn: We write to express our strong support for elevating the U.S. Environmental Protection Agency (EPA) to the Cabinet level and we commend you for your dedication to this important issue.

As you know, we have all previously supported legislation to elevate EPA. Now, we can offer not only our collective experience as previous EPA Administrators, but four of us also spent the last 18 months participating on the National Commission on the Environment, which Mr. Train chaired (Mr. Reilly could not participate because he was Administrator of EPA at the time). World Wildlife Fund convened this bipartisan Commission in 1991 to review U.S. environmental policy and develop a strategy to address the compelling environmental threats of the future. Our report, *Choosing a Sustainable Future*, was released in December. Several copies are enclosed with this letter.

We would like to share with you the fruits of our experience and deliberation, specifically relating to a Department of the Environment. The main theme of our report is the importance of recognizing and addressing the basic interdependence of environmental and other policies. It is our strong belief that once policy makers identify areas of common concern with the environment and consider them up front, new alliances can be forged, innovative approaches designed, and many problems avoided. There is no doubt that prevention of a problem is cheaper and more effective than attempting to remedy one after the fact.

Environmental regulation can never be more than a small part of achieving this type of cross-sectoral policy integration. Pollution prevention and environmental improvement require a Department of the Environment that has a broader mission and more diverse capabilities than the current EPA. Thus, one of the most important recommendations of our Commission is:

Congress and the President should create a Department of the Environment. A principal function of the new department would be the formulation and oversight of the National Environmental Strategy. (p. 50)

Congress should enact an organic statute that creates a Department of the Environment with a clear mission. In our view, the efficacy of EPA has been diminished by its lack of mandate. If the organic legislation creating a Department of the Environment included a statement of purpose, the department would be better able to set priorities and take actions to achieve them. One of the new department's priorities should be to integrate environmental issues into other policy areas and promote sustainable development. Chapter 1 of our report describes what sustainable development means in this context. We also believe that the new department should develop a National Environmental Strategy. This strategy would be developed with input from other departments, the White House Office on Environmental Policy, the Congress, private businesses, and the public. It would be a critical tool for moving the United States toward a sustainable development path. Its contents and approval process could be prescribed in the department's organic legislation or it could be developed by an expert panel or commission, or by the new department with consultation.

A Department of Environment must have the capability to gather and interpret reliable statistical information. Reliable environmental statistics also will be essential components of a meaningful National Environmental Strategy. Long-range forecasting (and specific incremental and long term goals) and the ability to monitor and evaluate environmental conditions are also priority functions for effective environmental policy making. (See pages 108-111 of the report).

In summary, we support the elevation of EPA to the Cabinet level, and strongly urge you to consider giving substance to that elevation by empowering the department with a clear and strong mandate. We would be happy to work with you in shaping legislation to strengthen it as we have described briefly in this letter.

Sincerely,

RUSSELL E. TRAIN, *Chairman*
World Wildlife Fund and The National Commission on the Environment

WILLIAM D. RUCKELSHAUS, *Chairman and CEO*
Browning-Ferris Industries

LEE M. THOMAS, *Chairman and CEO*
Law Companies Environmental Group

DOUGLAS M. COSTLE, *Distinguished Senior Fellow*
Institute for Sustainable Communities

WILLIAM K. REILLY, *Senior Fellow*
World Wildlife Fund

ENVIRONMENTAL RESEARCH
AND DEVELOPMENT

STRENGTHENING THE
FEDERAL INFRASTRUCTURE

DECEMBER 1992

A Report of the
CARNEGIE COMMISSION
ON SCIENCE, TECHNOLOGY, AND GOVERNMENT

CONTENTS

FOREWORD	7
PREFACE	9
THE ENVIRONMENTAL CHALLENGE: SUMMARY AND RECOMMENDATIONS	11
S&T as Sources of Innovation, 12	
Improving the Federal Effort, 13	
Recommendations, 14	
The Way Forward, 22	
PART I. R&D FOR THE ENVIRONMENT	
1. THE ENVIRONMENTAL CHALLENGES OF TODAY AND TOMORROW	27
People and Global Environmental Change, 29	
Population Growth and Increasing Consumer Demand, 29	

Scale of Environmental Damage, 30	
Economic Benefits, Environmental Costs, 30	
The Key Role of Environmental R&D, 31	
S&T as Sources of Innovation, 31	
Natural and Social Sciences, 32	
Global Effort Needed, 33	
Goals and Priorities, 34	
An Effective Federal Environmental R&D Program, 34	
2. THE PRESENT R&D SYSTEM: WHY IMPROVEMENTS ARE NECESSARY	35
R&D Missions of the Major Departments and Agencies, 35	
Improving the Federal R&D Effort, 36	
Weaknesses of the Present System, 39	
Technology Development, 42	
U.S. Technology Policy and the Environment, 45	
Matching Resources with Problems, 45	
Organizational Considerations, 46	
PART II. RECOMMENDATIONS FOR STRENGTHENING THE FEDERAL ENVIRONMENTAL R&D SYSTEM	
3. INTRODUCTION	55
4. LEADERSHIP AND THE RESEARCH AGENDA	57
The Office of Environmental Quality, 58	
Institute for Environmental Assessment, 59	
Environmental Research and Monitoring Initiative, 60	
Office of Science and Technology Policy, 61	
5. STRENGTHENING THE FEDERAL R&D INFRASTRUCTURE	62
Environmental Protection Agency, 63	
Environmental Monitoring Agency, 72	
National Center for Environmental Information, 76	
Environmental Technologies Program, 78	
National Aeronautics and Space Administration, 79	
National Institute of Environmental Health Sciences, 81	
Department of the Interior, 82	
National Park Service, 82	
Bureau of Land Management, 83	
Department of Agriculture, 84	
Department of Energy National Laboratories, 86	
Department of Defense, 89	
Hazardous Waste R&D, 90	

6. LINKING AND COORDINATING PROGRAMS	92
Strengthening Linkages, 93	
International Cooperation, 94	
Multidisciplinary Communication and Collaboration, 97	
Links with Nongovernmental Organizations, 99	
Links with Industry, 101	
7. BUILDING A STRONG INTELLECTUAL BASE	104
National Science Foundation, 104	
Improving Education, 105	
8. CONCLUSION: KNOWLEDGE AND LEADERSHIP FOR THE FUTURE	107
Knowledge and Progress, 107	
Supporting Agency Missions, 108	
Assessment, Strategic Planning, and Policy Development, 108	
Better Monitoring and Information Storage, 109	
Maintaining a Strong Science and Technology Base, 110	
Creating Linkages, 110	
The Importance of Leadership, 111	
The Paradox of Progress, 111	
APPENDIXES	
A. FEDERAL ENVIRONMENTAL R&D PROGRAMS	115
B. BIOGRAPHIES OF TASK FORCE MEMBERS	130
NOTES AND REFERENCES	135
Members of the Carnegie Commission on Science, Technology, and Government	141
Members of the Advisory Council, Carnegie Commission on Science, Technology, and Government	142
Members of the Task Force on the Organization of Federal Environmental R&D Programs	143

FOREWORD

Environmental protection is an issue that cuts across the missions of more than a dozen major federal departments and agencies. Consequently, environmental research and development programs are highly decentralized, and directing and coordinating these diverse efforts is a particular challenge for policymakers.

Few would disagree that environmental protection and sustainable development will be among the highest priorities on the national agenda in the decades ahead. Since research and development programs will generate much of the intellectual basis for the environmental policies and actions of the future, it is essential that these programs be well organized, adequately funded, and closely linked with the policymaking process.

The earth may be viewed as an interacting set of complex biological and physical systems, and a host of human actions can adversely affect them. Consequently, federal environmental R&D encompasses a broad range of programs housed in numerous departments and agencies.

Today, the federal environmental R&D system is a loose collection of laboratories and programs, most of which were established to respond to the problems and priorities of the past. While many of these problems remain today, we also face a new set of challenges, and responding to them requires a more dynamic, interrelated organizational structure and more effective assessment and policymaking processes.

Over the past two years, a task force of the nation's leading experts on environmental R&D focused their attention on the organizational and decision-making needs of the federal government in this area. Their findings and recommendations, presented in this report, were adopted by the Carnegie Commission in September of 1992.

More than three decades ago, President John F. Kennedy spoke eloquently of the challenge facing the nation and the world: "It is our task in our time and in our generation to hand down undiminished to those who come after us, as was handed down to us by those who went before, the natural wealth and beauty which is ours."* This report was developed in that spirit.

William T. Golden, Co-Chair
Joshua Lederberg, Co-Chair

* Address at the dedication ceremonies of the National Wildlife Federation Building, March 3, 1961.

PREFACE

This report was approved by the Carnegie Commission on Science, Technology, and Government in September of 1992. It was prepared by the Task Force on the Organization of Federal Environmental R&D Programs:

Robert W. Fri, Co-Chair
H. Guyford Stever, Co-Chair
Douglas M. Costle
Edward A. Frieman
Stephen J. Gage
Bruce W. Kanth
Gordon J. F. MacDonald

Gilbert S. Omenn
David P. Rall
Gilbert F. White

Mark Schaefer, Senior Staff
Associate

The Task Force wishes to thank Steven J. Kafka, special consultant to the Task Force, for his extensive contributions to this report, particularly his thorough analysis of existing federal environmental R&D programs. We

thank Michael Kowalok and Paul Locke for their excellent analytical assistance. We are grateful to Jeffrey Porro for providing the Task Force with research and editorial assistance, to commission staff member Jeannette Aspden for editing the final document, to A. Bryce Hoflund and Jane Godshalk for assistance in producing the final report, and to Bonnie Bisol for aiding in the report release and distribution. We would also like to express our appreciation to Kathy Gramp and her colleagues at the American Association for the Advancement of Science for their thorough analysis of federal funding for environmental R&D.

We wish to thank Jesse Ausubel, Jonathan Bender, David Beckler, and David Robinson for their helpful suggestions throughout the task force's work. We also thank Harvey Brooks, J. Clarence Davies, Jeanne Gorman, and K. Elaine Hoagland for providing the Task Force with helpful comments and suggestions.

THE ENVIRONMENTAL CHALLENGE: SUMMARY AND RECOMMENDATIONS

Over the past three decades considerable progress has been made in recognizing the seriousness of the world's environmental problems. Although many positive steps have been taken to ameliorate them, we are only beginning to understand the complexities of the problems we face. In the years ahead, continuing struggle is likely because the two most significant forces of environmental degradation—the ever-growing world population and the drive for worldwide industrial and agricultural development—continue unabated.

The pressing and widespread threats to the biosphere appear more closely linked with the functioning of the world economy than they ever have before. Today's global economy has reinforced the geographic separation of resource extraction, production, and consumption. Hence, those who reap the economic benefits of using natural resources are often different from those who bear the environmental costs. This complex of issues was brought into sharper focus by the preparations for the United Nations Con-

ference on Environment and Development in Rio de Janeiro in June 1992 and by the conference itself. This new awareness led to an international agenda for research on environment and development and various non-binding agreements, but much more must be done to stem global environmental degradation.

S&T AS SOURCES OF INNOVATION

Our ability to respond to the environmental and economic challenges of today and tomorrow is strongly dependent on the quality of the information produced by a well-organized and productive federal research and development system.

This report addresses the research and development organizations and the decision-making processes that the federal government needs to enable it to work toward national and global environmental objectives. Until recently, a "catch up, clean up" approach has dominated U.S. environmental policies. Little attention has been paid to developing a proactive analytical and policymaking system that can identify trends, anticipate problems, and address causes instead of symptoms. Our policies are beginning to change, but leadership and innovative approaches to solving problems based on strong research and development programs are essential.

More than twenty years ago the first images of the surface of the earth as seen from the moon helped people to visualize our planet as a unit, an integrated set of systems—landmasses, atmosphere, oceans, the plant and animal kingdoms—and to realize that threats to one could harm them all. Since then, considerable progress has been made in solving some of the problems facing the biosphere, but other threats to the environment persist, and new ones have emerged: the thinning of the ozone layer, the destruction of the rain forests, climate change, the contamination of groundwater, and new threats to wetlands, farmland, and other renewable resources. Most of our problems are due to human actions, especially those related to population growth and increased consumption of resources. These problems pose a special challenge to the world's scientific and engineering communities, one that evokes the image of the first human steps on the moon: Can scientists and engineers generate the kind of large-scale and highly focused effort that took us into space and apply it to developing the understanding necessary to protect our global environment?

The environmental challenges that we face today demand a concerted international effort. Our ability to respond to these challenges is defined by what research is conducted, how it is organized, and how well it is presented

and used in establishing and implementing environmental policy. A wide range of research advances will be needed if "sustainable development" is to be achieved — growth that is a product of efficient consumption of energy and materials, minimizing waste and maximizing recycling, stabilizing land use, and assuring growth that does not damage the future environment on which further growth depends.

The United States must play a leading role in this effort, and doing so requires a vital, well-integrated federal environmental R&D system. Unfortunately, the existing federal environmental R&D infrastructure was built for another time and for a set of issues that no longer correspond to today's problems. If the federal government is to provide the scientific resources and leadership that a national and global environmental protection effort requires, a careful examination and rethinking of its R&D effort is essential.

IMPROVING THE FEDERAL EFFORT

At first glance, the federal environmental research enterprise seems impressive. More than a dozen federal departments and agencies conduct environment-related R&D; total spending is some \$5 billion a year (see Tables 1 and 2 on pages 37 and 38). The bulk of these expenditures is devoted to the physical sciences, with most of the remainder directed to engineering and the biological and health sciences (see Figure 1 on page 37). Largely because of its origins as a series of individual programs initiated in response to specific problems, much of our current R&D system is diffuse, reactive, and focused on short-range, end-of-the-pipe solutions. And, because mechanisms to coordinate the products of environmental research conducted by federal, state, academic, and nongovernmental institutions are weak, it is difficult to develop the comprehensive information necessary to evaluate significant changes in the state of the environment.

Today's complicated and urgent environmental challenges cannot be addressed in the piecemeal fashion of the past. At a time of intense international economic competition and growing federal budget deficits, careful matching of resources with problems is vital. The end of the Cold War and limitations on defense spending offer opportunities to focus more attention on other societal needs, such as environmental protection. We believe that the federal environmental R&D effort must be broadened, its agencies and programs better coordinated, and its resources more focused on identifying root causes and anticipating emerging problems. As a nation, we face enormous environmental challenges. Strong and effective federal R&D programs are a prerequisite to attacking these problems successfully and, in doing

so, providing hope and a means of action for today's generation and those of the future.

RECOMMENDATIONS

If the federal government is to meet the environmental and natural resources challenges of the future, the distribution of R&D responsibilities across all departments and agencies must be rethought. Key guiding organizational considerations include effective support of department and agency missions; a capacity to conduct strategic planning, anticipate future R&D needs, and undertake comprehensive policy analyses; effective monitoring, information storage, and retrieval capabilities; a strong science and technology base; and effective linkages with other federal and international environmental R&D programs. Our recommendations that follow are grouped into four broad categories:

- Leadership and the research agenda
- Strengthening the federal R&D infrastructure
- Linking and coordinating programs
- Building a strong intellectual base

LEADERSHIP AND THE RESEARCH AGENDA

Leadership starts at the top, and the Executive Office of the President needs new mechanisms to foster cooperation between departments and agencies in their efforts to address high-priority problems. The President relies upon several entities within the Executive Office in setting the research agenda. These organizations must be strengthened in order to provide effective analysis and advice to the President on environmental issues.

- The White House apparatus for establishing environmental policy and for guiding federal environmental R&D programs should be strengthened by expanding the responsibilities of the existing units in the Executive Office of the President and by establishing a new institutional capability to assess scientific and technical information and analyze environmental issues from the standpoint of economic, social, and political considerations.

- *The mission of the existing White House Office of Environmental Quality (OEQ) should be expanded, giving it broad responsibility for developing*

environmental policies in the context of other considerations, particularly economic. The office should also work to identify ways in which the activities of all federal departments and agencies can be directed toward sustainable development and risk-reduction objectives.

The Council on Environmental Quality (CEQ) was established by the National Environmental Policy Act in 1969. Shortly afterward, the White House Office of Environmental Quality (OEQ) was established by the Environmental Quality Improvement Act of 1970. CEQ has always been the dominant organizational entity. However, over the past four years, CEQ has operated not as a council, but as an office administered by a chairman who also serves as the director of OEQ. We believe that the activities of CEQ should be integrated into the Office of Environmental Quality. We considered other organizational mechanisms to provide a focal point for environmental policymaking in the White House. Building on the existing OEQ, rather than establishing an entirely new entity is, in our view, the most efficient approach.

We believe that OEQ's mission should be expanded and that it should be administered by a director who serves simultaneously as the Assistant to the President for the Environment. In this capacity the director should lead efforts in the White House to develop environmental policy options, presenting proposals to the President and the Cabinet for their consideration. The director should also be responsible for looking across all departments and agencies and identifying ways in which federal activities can be directed toward the environmental objectives of the President.

As discussed in an earlier Commission report, actions should be taken "to assure the stable and sustained functioning of a high-level mechanism concerned with linking environment, energy, and the economy."¹ OEQ should work with OSTP to identify major R&D needs, to promote the improvement of risk assessment and risk management procedures, and to coordinate major R&D initiatives. In addition, OEQ should work closely with the Office of Management and Budget in guiding the budget process with respect to environmental programs.

■ *An Institute for Environmental Assessment (IEA) should be established to evaluate global and national environmental problems and to develop alternative approaches to them.* The federal government currently lacks a critical mass of individuals who can assess the information resulting from our natural science research efforts in the context of current economic, social, and political considerations. We recommend the establishment of an Institute for Environmental Assessment dedicated to the evaluation of global and national environmental problems, the analysis of research and monitoring data pertaining to them, the assessment of emerging environmental

technologies, and the development of economic, legal, and social analyses to aid in the development of environmental and risk-related policies. The institute should be administered by a director who reports to the Director of the White House Office of Environmental Quality (OEQ), or, alternatively, to the Secretary of a Department of the Environment.

We recommend that the IEA be provided with funds to undertake analysis within the institute itself and to support the work of individuals and institutions outside of the federal government through grants and contracts. At least half the institute's funding should be devoted to extramural studies conducted within nongovernmental organizations and academic institutions. Depending on its size and mission, an IEA could be located in the Executive Office, or in the Environmental Protection Agency or a proposed Department of the Environment. Alternatively, it could function as a quasigovernmental institution operated by a nongovernmental organization but reporting to the OEQ in the Executive Office.

■ *The President, with the guidance and support of Congress, should undertake an Environmental Research and Monitoring Initiative, a long-term effort to bring all federal environmental R&D programs into a common policy framework.* The Initiative should be guided by the Director of the Office of Environmental Quality and the Director of the Office of Science and Technology Policy and should involve the key administrators of federal R&D programs, as well as the Office of Management and Budget. The group should work to devise coherent short- and long-term R&D plans for each agency and department, including explicit goals and milestones.¹ Such an initiative could be a component of a broader National Environmental Strategy, which we understand the National Commission on the Environment will recommend in their upcoming report.¹

■ *The Office of Science and Technology Policy should coordinate a broader array of environmental R&D activities.* The Office of Science and Technology Policy (OSTP) within the Executive Office of the President is the science advisory unit of the White House, and is home to the Federal Coordinating Council on Science, Engineering, and Technology (FCCSET). The Council has proved to be an effective mechanism for coordinating the management of certain federal R&D programs. We recommend that OSTP use FCCSET to aid in the development of coherent federal environmental R&D programs and to address problems that cut across departments and agencies. Close interaction between OSTP as it coordinates R&D programs, the Office of Environmental Quality as it develops environmental policy and identifies research needs, and the Office of Management and Budget as it devises budget priorities, is essential if the federal government is to achieve an integrated, forward-looking environmental protection program.

STRENGTHENING THE FEDERAL R&D INFRASTRUCTURE

Our federal environmental R&D system is broad, diverse, and highly decentralized. There is a need to strengthen the individual and collective R&D efforts at the nine major departments and agencies with environmental R&D programs, and to expand their capacity to contribute to the evaluation and implementation of environmental policies.

■ The federal environmental R&D infrastructure should be strengthened by improving and streamlining EPA's existing laboratory organization, by supporting a group of nonfederal Environmental Research Institutes, by organizing a new U.S. Environmental Monitoring Agency and a National Center for Environmental Information, and by enhancing R&D capabilities in several key federal agencies (see pages 63-91).

■ *The Environmental Protection Agency's existing laboratory structure, now comprised of 12 laboratories, should be consolidated to create a National Ecological Systems Laboratory, a National Environmental Monitoring Systems Laboratory, a National Environmental Engineering Laboratory, and a National Health Effects Research Laboratory.* We recommend several substantial changes in the EPA laboratory structure to accommodate the growing need for integrated environmental systems research and monitoring. The first is the incorporation of EPA's six environmental processes and effects laboratories into a single national laboratory with multiple field locations. The second is the merging of EPA's two environmental monitoring support laboratories and the agency's other monitoring activities into a single national laboratory.⁴ (See Figure 6 on page 77). In addition, EPA's environmental engineering laboratories should be merged to form a single laboratory. The existing Health Effects Research Laboratory should be upgraded and designated a National Health Effects Research Laboratory.

■ *EPA should establish and support up to six major Environmental Research Institutes (ERIs) associated with academic institutions and nongovernmental organizations across the country.* EPA's current Centers of Excellence program supports four university-based Environmental Research Centers (ERCs), each specializing in a particular research topic of agency interest. The work of the ERCs is severely limited by inadequate funding, currently averaging about \$1 million per center per year.

We believe that this program should be phased out and replaced with a set of major Environmental Research Institutes. In order to have a real impact on the environmental challenges facing the nation and the world, we believe that funding for each ERI should gradually rise to the level of \$10 to \$15 million annually for at least five years. We further propose that.

after considering the views of a full range of experts from within and outside government, the EPA Science Advisory Board make recommendations to the EPA Administrator regarding the missions of the institutes.

The institutes should operate cooperatively with the four EPA National Laboratories described above. It might be advantageous to choose problem-oriented themes for the institutes that cut across the missions of the intramural National Laboratories. Since the institutes should operate on a five-year cycle, this would allow the periodic modification of the institutes' priorities. In this manner, the institutes would function as a more flexible, problem-oriented, multidisciplinary component of the EPA or a proposed Department of the Environment, thereby complementing the structured, discipline-oriented, intramural National Laboratories. We envision a two-way flow of personnel between the National Laboratories and the institutes. This would give government scientists and engineers—and social scientists—an opportunity to benefit from the career growth and educational opportunities offered in the university setting. It would also enhance the National Laboratories by bringing some of the best scientists and engineers in the nation into government laboratories for extended periods.

■ *A new federal agency, the U.S. Environmental Monitoring Agency (EMA), should be organized by combining the National Oceanic and Atmospheric Administration (NOAA), now within the Department of Commerce, with the U.S. Geological Survey (USGS), now within the Department of the Interior.* Monitoring, mapping, inventorying, and forecasting with respect to our national and the global environment are the cornerstones of our federal environmental protection efforts. The present and future missions of NOAA and USGS are more similar to each other than they are to the missions of the departments in which they now reside. We believe that both organizations would operate more effectively together.

The proposed Environmental Monitoring Agency should maintain close ties with the National Aeronautics and Space Administration in order to link NASA Earth Observing System (EOS) and related environmental monitoring efforts with its own activities. The EMA should make use of data from a wide range of other agencies, including EPA, the Fish and Wildlife Service, and the National Institute for Environmental Health Services. We believe that the EMA could operate as an independent federal agency; however, if a Department of the Environment is established, the EMA should be part of it.⁴

■ *A National Center for Environmental Information (NCEI) should be established within the proposed U.S. Environmental Monitoring Agency.* Such a center would serve as a focal point for the storage and retrieval of

environmental information generated from a range of sources, primarily federal departments and agencies, but also state and local governments, academia, industry, and nongovernmental organizations. The Center should be responsible for developing policies to ensure that environmental data are properly stored and readily accessible to all users (see pages 76–78). The NCEI should build strong ties with the National Library of Medicine (NLM), whose Board of Regents recently approved expansion of its efforts in toxicology and environmental health.⁶

The R&D capabilities of several key federal agencies should be strengthened. The following recommendations are discussed in more detail in the report:

- *A federal interagency Environmental Technologies Program should be established to promote and support the development of advanced technologies by federal agencies, universities, industry, and nongovernmental organizations (see pages 78–79).*
- *The National Aeronautics and Space Administration should link its environmental monitoring activities closely with those of other federal departments and agencies and of other nations (see pages 79–81).*
- *The new research and training programs at the National Institute of Environmental Health Sciences should be expanded, and the Institute should establish closer ties with EPA's health research program (see pages 81–82).*
- *The Department of the Interior should develop a long-range plan for its environmental R&D activities and should work to integrate and focus its programs in the context of clearly defined goals (see page 82).*
- *The National Park Service should establish a strong environmental research and monitoring program to build the knowledge base necessary to protect the resources of the National Park system (see pages 82–83).*
- *The Bureau of Land Management should expand its environmental monitoring and technology programs and should seek the assistance of other federal agencies in devising land use, biological resources management, waste management, and monitoring programs to protect public lands and to ensure their productive use in the future (see pages 83–84).*
- *The Department of Agriculture should continue to strengthen its environmental R&D by following the recommendations recently made by the National Research Council and the congressional Office of Technology Assessment that call for a substantial increase in funding for competitive research grants and for a more structured, integrated, and coordinated R&D planning system (see pages 84–86).*

- *The R&D activities of the Department of Energy National Laboratories should be evaluated to determine their potential to make future contributions to national and international environmental R&D programs (see pages 86-89).*
- *Department of Defense environment-related research and development efforts should be integrated with those of other federal departments and agencies. Alternatively, some of these activities could be transferred to environmental R&D programs within other departments and agencies (see pages 89-90).*
- *A larger proportion of the funds devoted to the cleanup of hazardous waste at federal facilities should be directed to research and development (see pages 90-91).*

LINKING AND COORDINATING PROGRAMS

The global nature of environmental problems requires that U.S. environmental R&D programs operate in concert with those of other nations. Furthermore, the federal environmental R&D effort will operate most effectively if it is closely linked with complementary programs in academia, nongovernmental organizations, and industry. Since the environmental R&D system should be more than the sum of its parts, more effective interactions between all parties engaged in environmental R&D should be promoted.

- *In order to strengthen the link between environmental R&D and policy development, assessment capabilities across federal agencies should be expanded. Furthermore, U.S. environmental R&D programs should be coupled more closely with those of other nations. Greater cooperation among scientific disciplines and among federal, nongovernmental, and industrial research programs should be encouraged (see pages 92-97).*

■ *The linkages between environmental R&D and policy development should be strengthened, and the federal government should substantially increase its support of multidisciplinary policy studies and assessments designed to forge and evaluate these linkages.* The development of effective environmental policy requires interaction among the natural sciences, economics, political science, and law, as well as many other disciplines. To date, however, federal agencies have focused their environmental R&D efforts on the natural sciences: no single institution is responsible for pursuing funding authority to advance multidisciplinary research involving the social sciences. We recommend that the federal government devote a larger percentage of

total environmental R&D dollars to policy research and assessment, including studies of the economic, social, legal, and political aspects of environmental problems from regional, national, and international perspectives.

■ *The United States should couple its environmental research and development efforts more closely with those of other nations.* International agencies, including the United Nations Environment Program and specialized agencies such as the World Meteorological Organization, as well as key nongovernmental scientific organizations, are promoting a range of international collaborative R&D efforts. World Health Organization programs like the International Program on Chemical Safety make important contributions to public health throughout the world. The United States should actively support programs of this kind. The United States should also collaborate with the European Community countries and with academic institutions abroad to develop and share new technologies. Collaborative relationships between the research institutions of various countries would be particularly worthwhile.

Other recommendations are discussed in more detail in the report:

- *Communication and collaboration between the ecological and environmental health research communities should be enhanced in order to evaluate and address environmental problems in an integrated fashion* (see pages 37-99).
- *The environmental research and policymaking linkages between federal agencies and nongovernmental organizations should be strengthened* (see pages 99-101).
- *Environmental R&D programs within the federal government and industry should be linked more closely, and the federal government should continue to provide incentives for environmental R&D efforts in industry in order to advance common goals* (see pages 101-103).

BUILDING A STRONG INTELLECTUAL BASE

An improved R&D system will survive only if it is built on a strong foundation. Implicit in the recommendations above is the assumption that there must be a pool of highly trained professionals to carry out the research and development activities that are crucial to our environmental protection programs. There is a critical need for a continuing supply of well-trained professionals and state-of-the-art facilities and equipment to support their research efforts.

■ The science and technology base that underpins our environmental R&D programs must be strengthened to ensure the availability of environmental scientists and engineers, social scientists, and policy analysts, and to ensure adequate facilities and equipment to support their work (see pages 104-106).

■ *The National Science Foundation and other government agencies should take steps to strengthen the base upon which our national environmental R&D programs are built.* The scope and direction of grant programs in NSF and other agencies that support environmental R&D activities in universities, nongovernmental organizations, and elsewhere should be examined carefully to determine if additional funding is needed to support certain kinds of research activities. We believe that the NSF, in particular, should substantially expand extramural grants programs devoted to research designed to integrate the thinking across multiple disciplines, including policy research and assessment. NSF should pay particular attention to the adequacy of the nation's environmental science and technology disciplinary base. In addition, NSF, with the assistance of the National Research Council, should undertake a study of the future environmental R&D-related human resource needs of the nation.

■ *Both government and the private sector should take deliberate steps to improve educational programs in the environmental sciences.* Undergraduate biological, physical, engineering, business, and economics educational programs should include an environmental science component in their curricula. Graduate and postdoctoral training programs in the environmental and social sciences should be expanded.

THE WAY FORWARD

It is clear that wealth and physical resources alone will not be enough to solve the daunting environmental challenges we face. Advanced knowledge of earth's systems and processes is crucial, and developing it requires a strong federal effort in environmental R&D.

If adopted, our recommendations would aid in accomplishing several objectives, including a strengthening of the contribution of environmental R&D to the missions of federal departments and agencies. Monitoring and information storage would be improved, as would the government's ability to engage in assessment, strategic planning, and more effective environmental policy development. Better linkages among federal entities and with outside organizations will yield new knowledge, and investments in

a strong science and technology base will help to ensure a continuing flow of high-quality environmental R&D.

Fundamentally, however, the federal government's environmental R&D effort suffers from weak leadership. It is a lack of direction, focus, and coordination that most limits the federal R&D enterprise. The United States has the ability to remain at the forefront of environmental R&D and consequently to meet the global environmental protection needs of the 21st century, but significant improvements must be made in our present system.

PART I
R&D FOR THE ENVIRONMENT

I

THE ENVIRONMENTAL CHALLENGES OF
TODAY AND TOMORROW

For most of those who watched the first moon landing in July 1969, two indelible images remain. The first is the television picture of the surface of the moon as Neil Armstrong stepped from the lunar lander. The second is the image of the surface of the earth, that breathtaking picture of our planet as seen from our closest celestial neighbor. The first image was a triumphal one, summarizing a decade of American technological achievements in space. But for many the second image was a warning.

At a time when public awareness of environmental problems was very much in its infancy, that image of our planet helped people to understand that the Earth is an integrated set of systems—landmasses, the atmosphere, oceans, the plant and animal kingdoms—and that a threat to one could harm them all. As one observer has written, "The image brought home as never before that our home is, after all, a planet—small, self-contained, and in some ways perhaps, fragile."⁷

In the more than twenty years since the nation first saw the images from the moon, scientific knowledge about the components of the earth's biosphere and the effects of human activity on them has increased, public concern has grown, and national, state, and local governments have enacted a wide range of environmental programs. As a result, progress has been made in some of the problem areas that first attracted widespread attention in the late 1960s. A 1991 report by the Organization for Economic Cooperation and Development (OECD) listed a number of achievements. These included reduction of urban air pollution by lead, sulfur dioxide, and particulate matter; reduced pollution of waterways by organic substances as a result of treatment of household and industrial wastewater; a decrease in the number of accidental oil spills; increases in the area of protected land and habitats; increased forest resources; better protection of a number of game species; a growing population of several threatened species; and reduction in the release into the environment of certain dangerous chemicals, such as DDT, PCBs, and mercury compounds.⁸

Some time after the 1972 Stockholm Conference on the Environment, however, a review by the United Nations Environment Program found that human interventions in natural systems had increased on a massive scale, and that there was an urgent need for remedial and preventive action. Those interventions had been accompanied by momentous advances in industrial activity and agricultural production and in human longevity and health.⁹

The past two decades have thus seen the persistence of some threats to the environment and the emergence of dangerous new ones. While there is less sulfur dioxide in the air in some cities, nitrogen oxides, urban smog, and fine particulates continue to be major problems. Growing concentrations of carbon dioxide and other greenhouse gases threaten to raise global temperatures. In the middle and late 1980s, the discovery of a thinning in the ozone layer over Antarctica led to the judgment that the earth's protective ozone layer is being depleted much more quickly in some regions than had been thought. About 27 million acres of tropical forest are estimated to be disappearing each year, taking with them a wealth of biological diversity that can never be replaced. Groundwaters, once thought to be invulnerable to contamination, have deteriorated because of salinization and pollution from urban runoff, pesticides, and seepage from contaminated industrial sites. Soil continues to be degraded by erosion and pollution from a wide range of sources, and development is putting pressure on critical environmental areas such as coastal regions and wetlands, farmland, and natural preserves. Many areas are becoming more vulnerable to extreme events such as droughts and floods. In short, our planet is still very much in danger.

PEOPLE AND GLOBAL ENVIRONMENTAL CHANGE

Although each of these problems has unique characteristics, all have a common cause—the actions of humans. The earth's environment has experienced dramatic changes in its five-billion-year history, but most have resulted from natural events: the movement of continents and oceans, the coming and going of ice ages, changes in the magnetic orientation of the earth, the evolution and extinction of plant and animal species. These natural forces continue to work today, but as a recent National Research Council study stressed: "The earth has entered a period of hydrological, climatological, and biological change that differs from previous episodes of global change in the extent to which it is human in origin. Humans have always sought to transform their surroundings. But, for the first time, they have begun to play a central role in altering global biogeochemical systems and the earth as a whole."¹⁰

POPULATION GROWTH AND INCREASING CONSUMER DEMAND

Human population growth and increased and more diverse consumer demand are the chief driving forces for this stress on the biosphere. Population growth has been dramatic. Human population did not reach the one billion mark until about 1830. It reached two billion in the 1930s, four billion in 1975, and will probably reach six billion in 1997. The rate of future growth and the times at which population may be expected to stabilize vary greatly from region to region and are determined by social and economic factors that affect development in each country. With current growth rates, world population would double again in 40 years, but the doubling figure may come much sooner or later, depending upon policies adopted in the meantime.¹¹

More people consume more resources. Although technological advance can help alleviate the stresses imposed by population growth, technical fixes and economic expansion alone cannot be relied on to solve the population problem.¹²

But population growth *per se* is only part of the problem. The quantity and diversity of goods consumed by many of the earth's people have been rising. While this means that some people are better off, many of the processes that raise living standards deplete the vital resources—soils, forests, species, water—on which future populations depend. Thus, while population growth is slowing in wealthier countries, these nations continue to use more energy and other natural resources and produce more contaminants than do developing nations.

The combination of population growth and rising consumer demand has particularly ominous implications for the future. The people in poorer nations want and deserve living standards more like those of the developed world. However, the challenge is to raise their living standards without further damaging the environment and making them more vulnerable to natural disaster. As William Ruckelshaus has warned, "If the four-fifths of humanity now in developing nations attempt to create wealth using the methods of the past, at some point the result will be unacceptable world ecological damage."¹

SCALE OF ENVIRONMENTAL DAMAGE

The scale of environmental damage has also increased dramatically. Human-induced environmental damage was once characterized by local episodes of pollution that were confined to discrete geographical areas. Now cause and effect often lie in different parts of the globe. For example, pollutant emissions from factories in one part of the globe may cause acid rain half a continent or more away. Introducing irrigated farming in one part of the world may reduce the productivity of marine fisheries elsewhere by altering water quality and flow patterns through damming or consumption. The use of chlorofluorocarbons (CFCs) in the developed world affects the atmosphere for people on every continent.

The need to address environmental problems in the context of local communities, each with its distinctive combination of resources and people, is becoming more and more urgent. Significant environmental degradation is taking place over decades and years, not centuries. Moreover, the actions of humans today can have effects far into the future that will be difficult to reverse in the short run. Some, such as the extinction of species, are irreversible. Because environmental systems are operating closer to their limits, the problems are likely to occur sooner, and systems are likely to take longer to recover. For example, the CFCs we emit today will continue to deplete stratospheric ozone for decades, and arresting the growth of emissions of greenhouse gases still leaves us with the possibility of global climate change for years into the future.

ECONOMIC BENEFITS, ENVIRONMENTAL COSTS

The pressing and widespread threats to the biosphere appear more closely linked with the functioning of the world economy than ever before. Today's

global economy has reinforced the geographic separation of resource extraction, production, and consumption. Hence, those who reap the economic benefits of using natural resources are often different from those who bear the environmental costs. This complex of issues was brought into sharper focus by the preparations for the United Nations Conference on Environment and Development in Rio de Janeiro in June 1992 and by the conference itself. This new awareness led to an international agenda for research on environment and development and various nonbinding agreements, but much more must be done to stem global environmental degradation.

THE KEY ROLE OF ENVIRONMENTAL R&D

The nation will be able to deal much more effectively with environmental problems once they are better understood. Our ability to understand earth processes and human dynamics is determined by what research is conducted, how it is organized, and how well it is assessed and presented in establishing and implementing environmental policy. And our ability to identify, control, prevent, and clean up pollutants is limited by the effectiveness of the technologies we develop and our ingenuity in finding sound means of promoting the widespread adoption of those technologies. Environmental problems pose a special challenge to the world's scientific and engineering communities, one that evokes the image of the first human steps on the moon: Can scientists and engineers generate the kind of large-scale and highly focused effort that took us into space and apply it to developing the understanding necessary to protect our global environment?

S&T AS SOURCES OF INNOVATION

We believe that our ability to respond to the environmental and economic challenges of today and tomorrow is strongly dependent on the information produced by a well-organized and productive federal research and development system. But we also recognize that protecting the environment will require a new and more effective application of scientific and technological skills. Many of the accomplishments of science and technology that have helped achieve a higher standard of living in the past have been geared to using more and more resources to produce more and more goods and services.

As Congressman George E. Brown, Jr., recently described the problem: "If we embrace the belief in science and technology as the great contributors

to progress, then are we also embracing resource depletion, environmental degradation, and economic disparity in the name of this progress?" He points out that the solution is to "begin to think of science and technology in entirely different terms—not as mechanisms to increase our wealth and comfort through exploitation of material resources, but as sources of innovation that can drive us to less consumption, less pollution, less depletion of resources, and lower rates of population growth."¹⁴

Technology has already allowed us to use resources more efficiently, but meeting the future demands of both developing and developed countries will require new technologies that are highly efficient and that result in little or no waste (see Box 1).

NATURAL AND SOCIAL SCIENCES

Meeting the challenges of the future requires research in both the natural and social sciences, as well as multidisciplinary studies that cut across fields of science. A major research goal in the natural sciences, for example, is to advance our knowledge of earth systems so that environmental processes can be better modeled. This will require sophisticated technology, including space-based and earth-based observation systems to collect data and to verify model predictions, and information management systems to maintain comprehensive databases. Advances in the biomedical sciences will cast light on the susceptibilities of humans to environmental risks. More knowledge of the basic mechanisms of initiation, promotion, and prevention of diseases and disorders will allow us to anticipate, and respond to, environmental health threats. Similarly, advances in all areas of environmental engineering, earth systems, and social sciences are needed in order to identify and develop new pollution prevention techniques and to promote mitigation measures.

Perhaps most important, a wide range of research advances will be needed if "sustainable development" is to be achieved—growth that is a product of efficient consumption of energy and materials, minimizing waste and maximizing recycling, stabilizing land use, and ensuring that no damage is done to the future environment on which further growth depends.

Society, however, cannot apply a quick technological fix to every environmental problem it encounters. The social sciences have a vital role to play in understanding how human activities influence the physical, chemical, and biological processes of the earth system and in devising means of changing patterns of human behavior. Finding more effective ways to promote stable population is especially important. Since environmental degra-

Box 1. Low-Waste/No-Waste Technologies—the Key to Attaining Global Environmental Goals

If global environmental goals are to be attained, governmental policies must encourage development of low-waste/no-waste technologies. The efforts of the Du Pont Company provide one example of the potential of American industry to promote environmentally benign technologies. Du Pont invented nylon and has produced it in the United States for more than 50 years. The processes by which the final product as well as the major intermediate compounds are made have been improved continually in terms of yield, quality, and waste minimization. Currently, two U.S. plants make the primary intermediate compounds through essentially identical processes, resulting in the same yield and quality characteristics and about the same waste generation and emission.

A new, advanced plant is now being built by Du Pont in Singapore to produce the key nylon intermediate, adipic acid. It will use the same process, based on cyclohexane technology, as the two U.S. plants. The process has, however, been improved so that there is a higher yield of product, less consumption of energy, and considerably less waste generated (about 20 percent less waste water alone); air emissions have also been reduced, by 97 to 99 percent. A material that was formerly waste has also been turned into a beneficial product for commercial sale. Greenhouse gases, now emitted from the plants in the United States, will be reclaimed or destroyed, and not released to the atmosphere. Overall, the Singapore plant will be less energy-intensive and much more environmentally friendly than the existing plants.

Du Pont's next-generation adipic acid plant is being planned for Europe, where the company plans to use a step change in technology that will bring further improvements to the product and reduce the potential environmental load from the plant even more than the Singapore plant. This technology will achieve considerable reductions in air and water emissions, and by-products will be converted back to feedstock and recycled into the process. No oxides of nitrogen or waste water will be released into the environment. Commercialization of this facility is expected within the next 4 to 6 years. After the new technologies have been proven in commercial operations, the process and environmental improvements in both the Singapore and European plants will be considered for retrofitting into the U.S. plants.

ation is closely linked with industrialization, we must explore ways to harness economic forces to work for environmental protection, not against it.

GLOBAL EFFORT NEEDED

Ultimately, ensuring that our planet will sustain the human family in perpetuity will take a global effort with keen sensitivity to geographic diversity. The importance of international collaboration in environmental R&D is under-

scored by the past record of research accomplishments. U.S. R&D efforts in many areas have been influenced strongly by the accomplishments of scientists and engineers in other nations. For example, much of the original research on major environmental problems, such as acid rain and global climate change, was done by investigators in Europe and Scandinavia.¹¹ The United States, as a major source of scientific and technological know-how, will have to play a leading role, in concert with other major developed countries.

GOALS AND PRIORITIES

Finally, it is important to articulate our environmental goals clearly and to set well-defined priorities. To achieve a sustainable society, we must have a clear understanding of our environmental objectives and a strategy for achieving them. This is especially true at a time when both developing and developed countries are faced with major economic challenges. Since not all environmental problems can be solved at once, we must determine which are the most important. A close linkage between the needs of policymakers and the research enterprise is essential for this purpose.

AN EFFECTIVE FEDERAL ENVIRONMENTAL R&D PROGRAM

As a nation, we face enormous environmental challenges, and strong and effective federal R&D programs are a prerequisite to attacking these problems successfully and, in doing so, providing hope and a means of action for today's generation and those of the future. As the chapters that follow will show, the existing federal R&D structure was constructed for a time and set of issues that no longer correspond to today's demands. An examination and rethinking of the federal government's environmental R&D effort is essential in order to ensure the scientific resources and leadership that a national and global environmental protection effort requires.

2

THE PRESENT R&D SYSTEM: WHY IMPROVEMENTS ARE NECESSARY

R&D MISSIONS OF THE MAJOR DEPARTMENTS AND AGENCIES

Although the definition of *environmental R&D* can vary widely, we define it as research and development directed to maintaining environmental quality, including monitoring, testing, evaluation, prevention, mitigation, assessment, and policy analysis. This definition includes

- Investigations designed to understand the structure and function of the biosphere and the impact that human activities have on it
- Research to understand the conditions necessary to support human existence without destroying the resource base
- Research to define the properties and adverse effects of toxic substances on human health and the environment
- The development of technologies to monitor pollutants and their impacts

- The development of pollution-control technologies
- The economic and social research directed at understanding the many complex, interrelated factors that influence environmental quality⁶

Using this definition, we examined federal R&D programs in the natural and physical sciences devoted to understanding both the pristine and degraded states of our air, land, water, and biological resources. We also considered programs directed at understanding the impacts of pollution on public health, as well as social science activities focusing on the human causes of and responses to resource depletion and environmental change. Much environmental R&D is not directly related to the impacts of pollution. A large proportion of the federal effort is devoted to understanding earth systems, including air, land, and ocean resources. Understanding these systems is critical to national and global environmental protection efforts.

Many federal agencies support environment-related research and development. The federal government spent more than \$5 billion on environmental R&D in fiscal year 1992. The bulk of this research was in the environmental sciences (\$3.6 billion) and engineering (\$1.1 billion) areas; information sciences (\$195 million) and work in the social sciences (\$40 million) made up the remainder (see Figure 1). Table 1 shows estimated federal support for environmental R&D by field of science, and Table 2 shows funding for environmental R&D by department and agency.

Major environmental research programs support the missions of numerous federal departments and agencies, including the Environmental Protection Agency, the National Science Foundation, the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, and the Departments of Energy, the Interior, Health and Human Services, Agriculture, and Defense.¹⁷ The activities of these departments and agencies are described in Appendix A and are summarized in Box 2 (page 40), and it is on the programs of these agencies that our analysis focuses.

IMPROVING THE FEDERAL R&D EFFORT

At first glance, the federal environmental research and development effort seems impressive. More than a dozen federal departments and agencies conduct environment-related R&D, and total annual federal funding is more than \$5 billion. Unfortunately, the scope, quality, and organization of this effort are unequal to the increasingly complex challenges to environmental R&D that we outlined earlier.

Figure 1. 1992 Federal Environmental R&D Expenditure, by Field of Science

Table 1. Estimated Federal Funding for Environmental R&D, by Field of Science (\$ billions, Fiscal Year 1992)

Environmental sciences	3.6
Physical	2.2
Biological	0.9
Health	0.5
Engineering	1.1
Information sciences	0.2
Social sciences	<0.1 ^a
	<u>5.0^b</u>

^a Approximately \$40 million.

^b Total reflects rounding.

Source: Based on an analysis by Kathleen Gramp, Albert H. Teich, and Stephen D. Nelson, American Association for the Advancement of Science, "Federal Funding of Environmental R&D," a report to the National Academy of Sciences and the Carnegie Commission on Science, Technology, and Government.

Table 2. Estimated Federal Funding for Environmental R&D by Agency (\$ million, Fiscal Year 1992)

Environmental Protection Agency	502
National Oceanic and Atmospheric Administration	319
National Science Foundation	541
Department of Health and Human Services	
National Institute of Environmental Health Sciences (NIEHS)	303 ^a
National Institute of Occupational Safety & Health (NIOSH)	93
Agency for Toxic Substances and Disease Registry (ATSDR)	55 ^b
National Center for Toxicological Research (NCTR)	3 ^c
Department of the Interior	
U.S. Geological Survey	367
Fish and Wildlife Service	85
Other	72
Department of Agriculture	
Agricultural Research Service	162
Cooperative State Research Service	119
Forest Service	115
Other	7
Department of Energy	799
Department of Defense	577
Department of Transportation	17
National Aeronautics and Space Administration	826
Smithsonian Institution	33
Agency for International Development	45
Tennessee Valley Authority	31
TOTAL	5,071

^a Includes \$51 million transferred under Superfund from EPA to NIEHS.

^b Funds are transferred to ATSDR from EPA through Superfund program.

^c The entire NCTR budget is about \$30 million. An estimated 10 percent of the center's budget is devoted to environment-related R&D.

Source: Based on an analysis by Kathleen Gramp, Alben H. Teich, and Stephen D. Nelson, American Association for the Advancement of Science, "Federal Funding of Environmental R&D," a report to the National Academy of Sciences and the Carnegie Commission on Science, Technology, and Government.

Our present environmental R&D system is the product of its origins and so is organized to deal with the simpler issues of the past. It began as a series of individual research programs that were undertaken in response to specific problems such as urban smog and the pollution of lakes and rivers. The first programs tended, therefore, to be short-term and crisis-oriented, focusing on mitigating dangers to the public health. In the 1970s and 1980s, for example, much of our attention was devoted to hazard identification: many chemicals had been used in commerce since the 1940s, but we knew little or nothing about their effects on human health or the environment.

Over the years, many federal laboratories were established in response to specific environmental concerns. Today, however, these laboratories do not meet the nation's needs. D. Allan Bromley, Assistant to the President for Science and Technology, recently described the need to rethink the missions of federal research laboratories

There are over 700 federal laboratories, and we invest over \$20 billion a year in them. They embrace an astonishing breadth and depth of science and technology, including some of the best science and technology to be found anywhere in the world. Many of these laboratories were established in the immediate post-World War II period, and they originally had very specific missions and objectives. Many of these original missions were satisfied years ago, so that the laboratories are having to adjust their programs to remain in close touch with evolving national needs. As components of the federal R&D enterprise, federal laboratories engaging in environmental R&D must redefine their missions in the context of evolving national needs.¹⁸

WEAKNESSES OF THE PRESENT SYSTEM

Ten or twenty years ago, questions about whether current land and water use could be maintained in the foreseeable future received relatively little attention. A "catch up, clean up" approach dominated the environmental protection agenda. Little attention was paid to developing an integrated, forward-looking R&D system that would identify trends, anticipate problems, and address root causes instead of symptoms.¹⁹

As a result, two decades later our R&D system remains diffuse, reactive, and focused on short-range, end-of-the-pipe solutions. Mechanisms to coordinate and integrate the products of environmental research conducted by federal, state, academic, and nongovernmental institutions are weak. Until recently, pollution reduction and prevention have received relatively little attention. We have difficulty developing the comprehensive information necessary to evaluate the state of the environment, the subtle ways in which it is changing, and the opportunities to help human populations become more resilient. Limitations in our ability to coordinate, assess, and disseminate research information hamper the public and private sectors' efforts to attack environmental problems. Finally, research to date on the international aspects of environmental conditions has received a relatively low priority in the federal government.²⁰ A number of organizations, such as Resources for the Future and the World Resources Institute, have invested in international research on the social and ecological consequences of U.S. environmental policy, but relatively little has been done directly by federal agencies.

Box 2. R&D Missions of the Major Departments and Agencies

More than twenty governmental organizations house R&D programs related to environmental quality. Specific environmental research programs support the missions of nine major federal departments and agencies.* Depending on how broadly one defines "environment," the federal government spent nearly \$5 billion on environmental R&D in fiscal year 1992. In the descriptions that follow, the budget figures for particular years refer to fiscal years.

Environmental Protection Agency. The EPA has a strong applied research program and is the *de facto* "lead agency" for environmental R&D, overseeing several programs that comprise the largest internal environmental research effort in the federal government. Regulation has been its dominant concern. The agency operates its research programs within the Office of Research and Development (ORD). ORD's eight offices and twelve laboratories had a 1992 budget of \$502 million. ORD's Office of Exploratory Research coordinates a small extramural program in basic, long-term research. EPA has traditionally devoted a small proportion of its resources to basic research. In real dollars, EPA's R&D budget declined by about 11 percent between 1980 and 1992.

National Science Foundation. The National Science Foundation (NSF) supports basic scientific and engineering research, education, and training in the environmental field through competitive grant programs. Two major divisions, covering a wide range of disciplines, funded research totaling more than \$540 million in 1992, making NSF the largest source of extramural grants in the environmental field. The major directorates of NSF fund research in biotic systems and resources, biosciences, geoscience, and the anthropogenic causes and effects of ecological change. This funding supports research at the National Center for Atmospheric Research and a number of oceanographic centers.

National Oceanic and Atmospheric Administration. The National Oceanic and Atmospheric Administration (NOAA), within the Department of Commerce, maintains an environmental research program that focuses on oceanic and atmospheric technology. The program includes work in applied weather research, water quality and coastal ecosystem management, marine life, and global climate change. Some \$319 million was spent in 1992 for environment-related research at NOAA, an increase of more than 50 percent over the \$216 million appropriated just three years ago. (This figure does not include \$265 million to support the National Environment Satellite, Data, and Information Service.)

Department of Energy. The Department of Energy (DOE) operates a program in Biological and Environmental Research that aims to identify, understand, and anticipate the long-term health and environmental consequences of energy use. Many of the key programs are carried out through the Office of Energy Research and the Fossil Energy Division; also involved are the National Environmental Research Parks and the National Labora-

Box 2. (continued)

ories system. DOE spent nearly \$800 million on environmental R&D in 1992. DOE plans to devote tremendous resources to the cleanup of waste generated at federal facilities engaged in weapons research. However, only a small proportion of these resources can be classified as R&D.

Department of the Interior. The bulk of environmental R&D at the Department of the Interior (DOI) is located in three of the department's five divisions, with the largest programs at the U.S. Geological Survey (\$367 million in 1992), and the Fish and Wildlife Service (\$85 million). USGS conducts research to gather, classify, and analyze information on land, water, mineral and energy resources; FWS manages the nation's fish and wildlife resources and conducts research through a system of National Research Centers and Cooperative Research Units. Small programs exist in the National Park Service, the Minerals Management Service, the Bureau of Mines, the Bureau of Land Management, and in other units, including the Bureau of Reclamation.

National Aeronautics and Space Administration. NASA's environment-related R&D is largely devoted to monitoring changes in land surface, oceans, and atmosphere through space-based observations. Through its Earth Observing System (EOS) program, NASA coordinates international efforts to monitor global change. NASA devoted \$826 million to environment-related research programs in 1992.

Department of Health and Human Services. The focal point for government research in the environmental health field is the National Institute of Environmental Health Sciences (NIEHS) within the National Institutes of Health. NIEHS supports several university-based Environmental Health Science Centers and supports pre- and post-doctoral training in environmental health sciences. Research funding at NIEHS in 1992 was \$303 million. Like other NIH institutes, it sponsors a large extramural grants program.

The National Institute of Occupational Safety and Health (NIOSH), the Center for Environmental Health and Injury Control (CEHIC), and the Agency for Toxic Substances and Disease Registry (ATSDR) also engage in environmental health research. ATSDR is responsible for conducting applied research on the health effects of exposure to hazardous substances, while CEHIC engages in basic toxicology research. NIOSH's mission is to conduct research to ensure safe and healthful working conditions.¹ In 1992, \$93 million was spent on research at NIOSH. In addition, the National Center for Toxicological Research (NCTR), located within the Food and Drug Administration, conducts research on food contaminants and is working to advance risk assessment methodologies.

Department of Agriculture. The U.S. Department of Agriculture (USDA) houses the majority of its environment-related research in three program areas: the U.S. Forest Service (USFS), the Agricultural Research Service (ARS), and the Cooperative State Research Service. For fiscal year 1992, the Forest Service research program focuses on "national problem" areas,

Box 2. (continued)

including tropical forestry, recycling, and the ecological and social values of forest land. The Forest Service's 1992 R&D budget was about \$115 million. Soil erosion, irrigation, and pesticides and fertilizer studies constitute the bulk of the research program of the Agricultural Research Service. Funding for the ARS was \$162 million in 1992. The Cooperative State Research Service budget was \$119 million.

Department of Defense. All three branches of the military in the Department of Defense (DOD) have programs in environmental R&D. The largest of these efforts is in the Office of Naval Research (ONR) in the Department of the Navy. The U.S. Army Corps of Engineers has an active wetlands study program and coordinates the Strategic Environmental Resources and Development Program. Research at DoD is divided into two major categories: the natural environment and environmental quality. The budget for environmental R&D within DoD was \$577 million in 1992.

Smithsonian Institution. Though relatively small, with a budget in FY 1992 of \$33 million, the Smithsonian's environmental R&D effort covers a wide range of areas, including biodiversity, ecology, conservation, and the history of the interaction between people and nature.

Other Agencies. Small environmental R&D programs are also found at the Agency for International Development, the Tennessee Valley Authority, and the Department of Transportation.

* For a detailed discussion see Steven J. Kafka.¹⁶

¹ NIOSH FY1992 Budget Justification, p. 487.

Insufficient resources are devoted to environmental biology, and there is a need for more interdisciplinary studies. Most ecological processes are inadequately understood, and several organizations have recommended increased federal funding in this area. Geographical studies of the interrelation of land, water, and biota in landscapes and regions are conspicuously weak. At both regional and local scales, economic, social, and political studies of environmental issues must be better integrated with studies in the natural sciences.²¹

TECHNOLOGY DEVELOPMENT

In discussing these issues, it is important to emphasize the "D" of environmental R&D—that is, technology development as separate from scientific inquiry. While research into the fundamental causes and processes of en-

vironmental problems is crucial, equally important is the technological research undertaken to develop methods of avoiding or mitigating environmental impacts. In other words, technology development seeks to offer solutions to the environmental problems that environmental research has uncovered and analyzed.

COSTS AND BENEFITS OF TECHNOLOGY

Historically, more advanced technology has often had detrimental environmental impacts; witness the widespread use of fossil fuels with the advent of the industrial age, the development of synthetic materials and their toxic by-products, or the soil erosion that accompanies more mechanically intensive farming practices. Technology development need not result in more pollution, however; on the contrary, technologies today are central to our efforts to protect the environment. The most promising areas for realizing the gains of environmental technology today relate to energy use and the development of alternative fuels, to agricultural practices that use less harmful pesticides developed through biotechnology, and to the reduction and prevention of pollution in industrial production processes.

INDUSTRY ROLE

Private industry is a major player in environmental R&D, particularly in applied research on environmental technologies. It is estimated that private industry funds more than half of all the R&D in the nation and that it conducts another 20 percent of the total through government contracts. In all, private industry is responsible for more than 70 percent of all R&D in the United States.²² And although it is difficult to pinpoint exactly how much privately funded research is related to the environment, a recent report by the World Resources Institute on environmentally critical technology states that up to half of industry R&D budgets is directed toward environmental technology R&D.²³

For quite some time, industry's efforts in environmental R&D were limited to developing technologies and processes aimed at meeting the requirements of environmental regulations. Today, however, industry's focus on environmental concerns results not only from the need to meet governmental standards; an even greater incentive is the potential for seizing new business opportunities and realizing economic gains. Industry is moving quickly to develop environmentally sound technologies that will use energy more efficiently and generate less waste, leading in turn to lower production

and disposal costs. The potential market for new and emerging technologies in air pollution control, composite materials, nonfossil fuels, bioengineering, and other fields is large, and industry is racing to capture it through its environmental technology R&D efforts. "Environmentally friendly" has become a powerful marketing tool as well, as producers aim to attract consumers with products that have less harmful impacts on the environment.

FEDERAL ROLE IN INDUSTRIAL TECHNOLOGY

Technology development was originally thought to be exclusively in the private sector's domain. But beginning with technological research in defense, space, and energy, a consensus has developed that government does have a role in promoting technology development, primarily at the precompetitive stage or the stage at which knowledge is nonproprietary and broadly applicable.⁴⁴ Technology is recognized as vital to economic development, and so is intricately wrapped up in public policy considerations. The 1988 Omnibus Trade and Competitiveness Act committed the government to supporting technology development that is "essential for long-term security and economic prosperity." Today it is becoming clear that environmental technologies fit this description.

The federal government is involved in promoting industrial efforts in environmental R&D in several ways. Besides the direct federal funding of R&D through contracts, the government also promotes industrial efforts in environmental R&D through economic incentives. A 20 percent tax credit for increments to R&D, enacted in 1981, aims to encourage R&D by reducing the overall cost of R&D by up to 4 percent. The National Cooperative Research Act of 1984 allows private companies to form research alliances without facing antitrust allegations.

The government is also a major purchaser of industrial products. Government procurement policies and specifications can have a significant impact on industrial programs. The Carnegie Commission's report *Technology and Economic Performance* cited the need for government to provide incentives for private-sector R&D through a stable regulatory environment to decrease investment risk and uncertainty, and through opportunities for the commercialization of technologies developed under government contract.⁴⁵

PUBLIC-PRIVATE PARTNERSHIP

The idea of a more explicit public-private partnership in environmental R&D is only beginning to take shape. The National Environmental Tech-

nology Applications Corporation (NETAC) is an example of such a partnership. Established in 1988, NETAC is a nonprofit consulting company set up through a cooperative agreement with EPA to focus on environmental technology commercialization. NETAC has programs directed at the evaluation of new technologies, international technology transfer, and technology development, demonstration, and evaluation, among others. It works to combine a private-sector profit orientation with a thorough understanding of the demands and goals of government regulation. We believe that this kind of partnership, focused on the needs of both the public and private sectors, is a step in the right direction.

U.S. TECHNOLOGY POLICY AND THE ENVIRONMENT

Despite the growing importance of environmental R&D in private industry and the undeniable connections between technology development and economic health, to date there has been little prominence given to environmental issues in U.S. technology policy. While other nations around the world support technological development as a way of solving national economic problems, some devoting entire government departments to issues of technology, the United States lacks even a "comprehensive coordinating mechanism within the Federal government to evaluate the Federal effort in developing technology."¹⁶ The lack of Federal support in basic technology development and the lack of a long-term technology policy led the World Resources Institute to conclude that the "need for the new technology to solve the environmental problems has been inadequately recognized and that the government's role in encouraging such technologies is underdeveloped."¹⁷

MATCHING RESOURCES WITH PROBLEMS

Environmental protection efforts are expensive, and at a time of intense international economic competition and growing federal deficits, it is important to match resources carefully with problems. Over the past twenty years, the United States (combined government and private efforts) has spent close to \$1 trillion on pollution control. It is estimated that environmental regulations imposed additional costs totaling \$109 billion in 1992, and that these costs will increase to \$184 billion annually by 2000.¹⁸ The economic benefits are more difficult to quantify but may exceed the costs by a large margin.

Figure 2. Federal Environmental R&D Spending vs. All Other Federal R&D Spending (1992)

Although regulatory costs are very large, the federal environmental R&D effort represents just 7 percent of total government R&D expenditures and 14 percent of total nondefense R&D expenditures (see Figure 2). With a budget deficit estimated at about \$300 billion for fiscal year 1992, and large deficits expected in future years, the federal government will be constrained in its ability to address environmental needs. As in the past, federal funding for environmental protection is not likely to keep pace with environmental problems and the expense of addressing them.¹⁹ However, if we are to attain the goal of reducing environmental regulatory costs while simultaneously improving environmental quality and addressing emerging problems, a robust environmental R&D effort is essential—one that carefully directs expenditures so that they yield maximum returns.

ORGANIZATIONAL CONSIDERATIONS

The structure and function of federal R&D programs are largely determined by the organization and mission of the federal departments and agencies they support. The federal environmental R&D infrastructure is shown in Figure 3. Federal agencies and departments cannot carry out their missions without the scientific and technological foundation created by research and development. Clearly, federal R&D programs must be organized in such

Figure 3. Current Federal Environmental R&D Infrastructure

a way that this fundamental requirement can be met. We do not believe, however, that a mere rearrangement of existing agencies and programs will solve the problem of directing environmental R&D toward its new and larger challenges. To be sure, reorganization may improve the management of current programs. But it is precisely this intimate—and necessary—connection with existing agency missions that most inhibits environmental R&D in tracking new problems.

Thus, while we take as given that environmental R&D should continue to support existing agency missions, we have been guided by other, broader principles in developing our recommendations—a capability to conduct strategic planning, to anticipate future R&D needs, and to undertake policy analyses; effective monitoring, information storage, and assessment capabilities; a strong science and technology base; and effective linkages with other federal and international programs. The key to achieving all of these objectives is leadership, particularly at the White House level. We discuss these principles briefly before moving on to our recommendations.

STRUCTURAL FRAGMENTATION

Structural fragmentation of environmental R&D hampers the strategic planning and policy coordination needed to establish and attain environmental goals. This problem is highlighted by the few instances in which it has been successfully addressed. For example, the Federal Coordinating Council on Science, Engineering, and Technology (FCCSET), administered through the White House Office of Science and Technology Policy, has played a key role in coordinating U.S. research efforts in global climate change. FCCSET oversees the U.S. Global Change Research Program, a \$1.3 billion research effort involving eleven major departments and agencies (see Box 3). The task is daunting, but FCCSET has been successful in bringing together many diverse programs and agencies in an effort to understand and attack one of the more complex global environmental problems facing us.

In general, strategic planning and policy coordination remain a problem. There is no focal point for setting broad environmental policy for all federal agencies. It is important to note that EPA in particular is not such a focal point at present. Although EPA is the leader in implementing laws and regulatory policies, its research program is not now the centerpiece of the federal environmental R&D system, and its current programs devote little attention to sustainable development. Furthermore, although FCCSET is a useful mechanism for coordinating agency research programs, it is less useful for setting new research goals.

Box 3. U.S. Global Change Research Program

The Federal Coordinating Council on Science, Engineering, and Technology (FCCSET), through its Committee on Earth Sciences (CES) established the U.S. Global Change Research Program (USGCRP) in 1989. Beginning with funding of \$134 million in FY89, USGCRP has grown to \$1.3 billion in 1992. The space- and ground-based observation and assessment capabilities are provided by a large number of federal agencies. Contributors to the focused research program include NASA, NSF, NOAA, DOE, USDA, DOI, and EPA. The Defense Department participates as well. Representatives from the Council on Environmental Quality, the Departments of State and Transportation, the Office of Management and Budget, and the White House offices of Science and Technology Policy and of Policy Development help provide executive oversight in addition to the participatory agencies.

The primary objectives of the research program are to

- Document the global earth system
- Study the physical, geological, chemical, biological, and social processes of the earth system
- Develop models of this system for predicting future trends and impacts

Research priorities include studies of greenhouse gases, ozone depletion, agriculture and ecosystems, and water policy. The goal of the program is to develop a scientific understanding of these phenomena and their potential impacts on human health and the environment.

LACK OF COORDINATION: CONSEQUENCES AND COSTS

Without a central coordinating mechanism, it is also difficult to establish budget priorities, conduct research efficiently and effectively, and then communicate the resulting data to those who can assess it and mold it into policy. For example, it took a multiagency panel, the National Acid Precipitation Assessment Program, more than ten years to address the many associated problems of acid rain, and the results of the project provided only weak guidance for policy directions.¹⁰ Convening a multiagency panel for each potential issue is not an efficient way of establishing a coordinating mechanism to address environmental problems.

One consequence of a fragmented federal environmental R&D system is the difficulty of obtaining timely and useful information. Relatively new environmental concerns such as acid rain and stratospheric ozone depletion have brought to light the need to improve environmental monitoring and statistical capabilities at the federal level. Without a system for compiling,

analyzing, and disseminating the massive amounts of statistical information generated by existing monitoring and research efforts, important data and findings are at risk of being used inappropriately, or being overlooked altogether.

The capacity both to meet regulatory needs and to provide data and information for basic research requires a strong environmental statistical and monitoring capacity. A new economic statistic is published in the U.S. virtually every day, and \$1.9 billion was spent in 1989 to maintain this information system.¹¹ Comparatively little broad statistical information is readily available in the environmental field, despite the fact that environmental trends can strongly influence public policies and may have an impact on our everyday lives.

CHANGING PROBLEMS, DIFFERENT RESPONSES

In assessing the scientific and technological base that undergirds environmental R&D programs, it is important to keep in mind the changing characteristics of environmental issues. The problems of today demand a more complex, coordinated, and flexible R&D structure than did those of twenty years ago. More disciplines must be recruited to the effort. In addition, just as our perspective must be broadened from a local to a national and ultimately to an international one, environmental R&D must also be expanded beyond the traditional natural and physical science disciplines. Environmental policy requires more than an understanding of the ecological and health effects of particular actions and pollutants; it demands an understanding of the effects of changes in population and consumption patterns, of the potential economic and social implications, and of the two-way interactions between human activities and environmental quality.

Of particular importance in this regard, federal environmental R&D programs must provide a solid scientific foundation for making environmental policy decisions based on risk assessment. The public perception of problems and the political process for addressing them may sometimes deflect attention from what are truly the greatest threats to human health or the environment. Effectively combining public perceptions of risk and scientific assessments of risk can lead to better policy and enhanced environmental and health quality. In order to determine which problems pose the greatest risk, however, the resources must be in place to identify and respond to scientifically determined risk. The ability of scientists, policymakers, and others to communicate information on health hazards and help the public understand environmental problems is an equally important part of the process.

Environmental research must be broadened and linkages established in other ways, too. Many of the existing research programs focus on treating symptoms. There is a need to enhance and link basic, long-term research with the applied research of the regulatory agencies. An understanding of environmental processes and technologies can allow problems to be addressed at their source and perhaps mitigated or eliminated before they require remedial actions. Also, the federal R&D effort must take into account the variability of geographical regions of the United States. As the EPA's *Unfinished Business* report recognizes, national priorities do not necessarily reflect local situations. Analysis of problems on the local level is necessary for setting environmental research and protection goals and priorities.¹¹

LINKS WITH OTHER NATIONS AND OTHER INSTITUTIONS

Aside from the need to coordinate research and policy internally, federal environmental R&D programs would benefit from stronger ties to nongovernmental organizations (NGOs), universities, and industries.¹² Researchers in these institutions, both in the United States and in foreign countries, often conduct the most forward-looking, cutting-edge research, but their work is often not well integrated into the policymaking process. And, because of the increasingly global nature of environmental issues, the federal research effort should create and support mechanisms that will connect U.S. scientists and engineers with those of other nations in order to share knowledge and allow all parties to take advantage of the best data available. Not only can the United States benefit from solutions developed in other countries, and vice versa, but the magnitude of impending global environmental problems may require the resources of more than one country.

DEPTH AND EFFECTIVENESS NEEDED

The federal environmental R&D effort covers a wide range of environmental problems, but the question before this Task Force is less one of breadth than it is one of efficiency and depth. Having been designed for a set of problems that no longer exists in its original form, our current federal environmental R&D effort is not structured in the most effective and comprehensive way to address either emerging problems or the increasingly complex interrelation of environmental issues that we face today. Change is needed, and in formulating our recommendations we have sought to pay particular at-

tion to organizing federal R&D efforts so that they reflect an inclusive and forward-looking strategic philosophy, ensure effective monitoring and information management, contribute to a strong science and technology base, and enhance linkages within and outside the federal effort. Strong leadership from the President down will be the key to improving the environmental R&D effort.

PART II
RECOMMENDATIONS FOR STRENGTHENING
THE FEDERAL ENVIRONMENTAL R&D SYSTEM

3 INTRODUCTION

Our recommendations for strengthening federal environmental R&D programs fall into four categories: leadership and the research agenda, strengthening the R&D infrastructure, linking and coordinating programs, and building a strong intellectual base.

We first suggest several organizational and process modifications that we think would substantially improve the capacity of the Executive Office of the President and senior department and agency officials to direct federal R&D efforts. Effective leadership is essential in a highly decentralized research and development system. This is particularly true for environmental R&D programs, which require carefully orchestrated multidisciplinary and interagency programs.

Our second set of recommendations is directed at the individual departments and agencies that comprise our federal environmental R&D system. Every federal department and agency has a mission (although these missions often overlap and are sometimes not well defined), and each relies

on R&D programs to varying degrees to support that mission. We present a series of recommendations designed to improve the effectiveness of several of the major federal R&D programs.

Our third set of recommendations points to a number of mechanisms to link federal programs to each other and to related programs in academia, nongovernmental organizations, and industry. We also underscore the importance of strong linkages between U.S. R&D programs and those of other nations. The national and global environmental problems facing the United States and the world are enormous and cannot be solved by one federal agency or even one nation. With this in mind, we suggest several ways to strengthen cooperative R&D efforts, both national and international.

Finally, we examine ways to ensure that the intellectual base of our environmental protection efforts is of adequate depth and breadth. Our educational system, from kindergarten to twelfth grade, to undergraduate, graduate, and postdoctoral training, must improve substantially if we are to meet the environmental challenges of the future. Although there are notable bright spots in our present educational system, there is much that can and must be improved in the years ahead.

As part of our examination of federal environmental R&D programs we considered a variety of organizational proposals, including suggestions to establish a National Institute for the Environment (NIE). We agree with several of the objectives of the NIE proposal: more support for environmental research, including ecological and interdisciplinary studies; improved storage of and access to data on environmental quality; and greater training opportunities for environmental scientists.¹⁴ However, in working to find ways to achieve these and other objectives we have attempted, wherever possible, to build upon the existing federal infrastructure, improving and expanding established institutions. We recommend below that EPA establish and support up to six centers for environmental research. These centers would have some of the features of an NIE.

In the past twenty years a number of proposals to reorganize the federal government have been advanced. These have ranged from grouping all federal entities with environmental or natural resources responsibilities into a Department of Natural Resources, to elevating the Environmental Protection Agency to a cabinet-level department. The former would alter the organization of R&D programs substantially, while the latter would have less impact on them. In preparing our report we have assumed that a major federal reorganization is not likely and have consequently thought about changes in the R&D system in the context of the present general departmental and agency structures and the possible establishment of a Department of the Environment.

In guiding federal departments and agencies in their efforts to protect the environment, the President relies on several entities within the Executive Office to provide analysis and advice — most notably the Council on Environmental Quality (CEQ), the Office of Science and Technology Policy (OSTP), the Office of Management and Budget, and the Council of Economic Advisers. Our recommendations in this chapter focus on the critical roles of White House policymaking offices, and on the means to provide these organizations with the information and analysis they need to advise the President on environmental policy issues and to direct federal environmental programs toward national objectives.

■ The White House apparatus for establishing environmental policy and for guiding federal environmental R&D programs should be strengthened by expanding the responsibilities of existing units in the Executive Office of the President and by establishing a new institutional capability to assess

scientific and technical information and to analyze environmental issues from the standpoint of economic, social, and political considerations.

THE OFFICE OF ENVIRONMENTAL QUALITY

■ *The mission of the existing White House Office of Environmental Quality (OEQ) should be expanded, giving it broad responsibility for developing environmental policies in the context of other considerations, particularly economic. The Office should also work to identify ways in which the activities of all federal departments and agencies can be directed toward sustainable development and risk-reduction objectives.*

The Council on Environmental Quality (CEQ) was established by the National Environmental Policy Act in 1969. Shortly afterward, the White House Office of Environmental Quality was established by the Environmental Quality Improvement Act of 1970.¹⁵ CEQ has been the dominant organizational entity. However, over the past four years, CEQ has operated not as a council, but as an office administered by a chairman who also serves as the director of OEQ. We believe the activities of CEQ should be integrated into the Office of Environmental Quality. We considered other organizational mechanisms to provide a focal point for environmental policy-making in the White House, but building on the existing OEQ, rather than establishing an entirely new entity is, in our view, the most efficient approach.

A robust, analytically sophisticated, and influential Office of Environmental Quality is a critical component of the White House policy-making apparatus. Several fundamental changes are needed in the operations of the Office if it is to address the challenges of the 1990s and beyond. We believe that OEQ's mission should be administered by a director who functions simultaneously as the Assistant to the President for the Environment. In this capacity the director should lead efforts in the White House to develop environmental, sustainable development, and risk-related policy options, presenting proposals to the President and the Cabinet for their consideration. The director should be given broad authority to look across all departments and agencies and identify ways in which federal activities can be directed toward the environmental objectives of the President.

In developing policy proposals, the OEQ should work to integrate environmental, energy, and economic considerations. As discussed in an earlier Commission report, actions should be taken "to assure the stable and sustained functioning of a high-level mechanism concerned with linking environment, energy, and the economy."¹⁶ We reaffirm the recommendations of that report: an expansion of staff expertise, particularly in the areas

of science, engineering, energy, and economics, and a capability to develop integrated environment, energy, and economic policies.

OEQ should also work with OSTP to identify major R&D needs, to promote the improvement of risk assessment and risk management procedures, and to coordinate major R&D initiatives. In addition, OEQ should work closely with the Office of Management and Budget in guiding the budget process with respect to environmental programs.

INSTITUTE FOR ENVIRONMENTAL ASSESSMENT

■ *An Institute for Environmental Assessment (IEA) should be established to evaluate global and national environmental problems and to develop alternative approaches to them.*

Meeting the enormous environmental challenges of the future will require not only a major commitment to research and development, but the development of innovative environmental protection policies. The federal government currently lacks a critical mass of individuals who can assess the information resulting from our natural science research efforts and consider its implications in the context of current economic, social, and political realities. Although various federal agencies have offices devoted to policy planning and evaluation, these units are relatively small, and they appropriately devote their resources to issues pertinent to the missions of the agencies they support. With the exception of a small staff within the President's Council on Environmental Quality, there is no federal organization devoted to the comprehensive analysis of environmental policy.

We believe that the federal government's effectiveness in addressing environmental problems is severely limited by this lack of analytical and planning capability. Assessment is the bridge between science and policy.¹⁷ Two major discontinuities now exist between the two: "One is that policy-makers fail to understand the limits of what science can determine. And the second is that scientists very frequently fail to understand what the policy community really needs to know."¹⁸ The federal government needs a mechanism to bridge the gap between science and policy.

We therefore recommend the establishment of an Institute for Environmental Assessment dedicated to the evaluation of global and national environmental problems, the achievement of sustainable development, the assessment of research and monitoring data, the evaluation of emerging environmental technologies, the development of economic, legal, and social analyses of mechanisms to address environmental problems, and the development and assessment of integrated strategies to address environ-

mental problems. The IEA could convene environmental assessment committees to bring individuals from various federal departments and agencies together to evaluate specific environmental problems and ways to respond to them.³⁹ Consistent with the successful approach of the congressional Office of Technology Assessment, the IEA should consider optional strategies and policies to address environmental problems. It should not, however, *recommend* particular courses of action. These decisions are the responsibility of the Executive Office of the President, Congress, and the heads of federal departments and agencies.

The institute should be administered by a director who reports to the Director of the White House Office of Environmental Quality. We recommend that the IEA be provided with funds to undertake analyses within the institute itself and to support the work of individuals and institutions outside of the federal government through grants and contracts. At least half the institute's funding should be devoted to extramural studies conducted within nongovernmental organizations and academic institutions. Depending on its size and mission, an IEA could be located in the Executive Office, or in the Environmental Protection Agency or a proposed Department of the Environment. Alternatively, it could function as a quasigovernmental institution operated by a nongovernmental organization but reporting to the OEQ in the Executive Office, or to the Secretary of a Department of the Environment.

ENVIRONMENTAL RESEARCH AND MONITORING INITIATIVE

■ *The President, with the guidance and support of Congress, should undertake an Environmental Research and Monitoring Initiative, a long-term effort to bring all federal environmental R&D programs into a common policy framework.*

Through an Environmental Research and Monitoring Initiative the President can take the actions necessary to develop an integrated federal environmental R&D program, an essential step toward better directing federal scientific and engineering resources toward national and global problems. This initiative could be a component of a broader National Environmental Strategy, which we understand the National Commission on the Environment will recommend in its upcoming report.⁴⁰ The Initiative should be guided by the Director of the Office of Environmental Quality (discussed above) and the Director of the Office of Science and Technology Policy and should involve the key administrators of federal R&D programs, as well as the Office of Management and Budget. The group should work with the Office of Management and Budget to devise coherent short- and long-term R&D plans for each agency, including explicit goals and mile-

stones.⁴¹ These plans should include a description of the contributions of agencies and departments to broad federal program objectives, keeping in mind the R&D requirements of individual agencies and departments in pursuing their missions.

To be successful, an initiative of this scope will require the guidance and support of Congress. Congressional authorization, appropriations, and oversight responsibilities with respect to federal environmental programs are divided among numerous congressional committees and subcommittees in both the Senate and the House of Representatives. If federal environmental R&D programs are to be properly coordinated and directed at well-defined goals, Congress, like the President, must provide clear and decisive leadership. The Carnegie Commission's Committee on Congress will soon be issuing a report on the challenges Congress faces in addressing science and technology issues of this kind.

A high-level initiative of this kind would give environmental R&D a higher priority in federal activities, would provide leadership to this critical area of science and technology policy, and would coordinate the diverse activities of federal departments and agencies. In the recommendations below, we suggest mechanisms to achieve these ends.

OFFICE OF SCIENCE AND TECHNOLOGY POLICY

- *The Office of Science and Technology Policy (OSTP) should coordinate a broader array of environmental R&D activities.*

The Office of Science and Technology Policy within the Executive Office of the President is home to the Federal Coordinating Council on Science, Engineering, and Technology (FCCSET), which has proven to be an effective mechanism for coordinating the management of certain federal R&D programs. The U.S. Global Change Research Program, for example, is administered under FCCSET through its Committee on Earth Sciences. In fiscal year 1992, the \$1.3 billion program coordinated federal R&D activities in eleven departments and agencies and served as the focal point for interactions with the international scientific community, agencies of other governments, and the private sector.⁴²

We recommend that OSTP use FCCSET to aid in the development of coherent federal environmental R&D programs to address problems that cut across departments and agencies. Close interaction between OSTP, as it coordinates R&D programs, the Office of Environmental Quality, as it develops environmental policy and research needs, and the Office of Management and Budget, as it devises budget priorities, is essential if the federal government is to achieve an integrated and forward-looking environmental protection program.

5 STRENGTHENING THE FEDERAL R&D INFRASTRUCTURE

Our federal environmental R&D system is broad, diverse, and highly decentralized. Led by the intramural programs of the Environmental Protection Agency and the U.S. Geological Survey, and complemented by the extensive extramural programs of the National Institute of Environmental Health Sciences and the National Science Foundation, the principal federal environmental R&D infrastructure is comprised of programs in numerous departments and agencies, each with a different mission and a different set of strengths and weaknesses. The recommendations below are aimed at strengthening the individual and collective R&D efforts of these organizations, as well as their ability to contribute to the evaluation and implementation of environmental policies.

■ The federal environmental R&D infrastructure should be strengthened by improving and streamlining EPA's existing laboratory organization, by supporting a group of nonfederal Environmental Research

Institutes, by organizing a new U.S. Environmental Monitoring Agency and a National Center for Environmental Information, and by enhancing R&D capabilities in several key federal agencies.

ENVIRONMENTAL PROTECTION AGENCY

NEW NATIONAL LABORATORIES

■ *The Environmental Protection Agency's existing laboratory structure, now comprised of 12 laboratories, should be consolidated to create a National Ecological Systems Laboratory, a National Environmental Monitoring Systems Laboratory, a National Environmental Engineering Laboratory, and a National Health Effects Research Laboratory.*

The efforts of EPA's Office of Research and Development (ORD) are critical to achieving the nation's environmental protection objectives. Since its inception, EPA has struggled with the optimal organization of the research units within the ORD and the agency as a whole. Several years ago William D. Ruckelshaus, EPA's first administrator, described the challenges the agency faced when it was first organized in 1970:

Our efforts to establish the scientific base presupposed by the environmental laws were hindered by the difficulties of managing the six different scientific establishments that EPA had inherited. Our scientific resources were housed in 56 separate laboratories scattered across the country. From the first, it was extremely difficult to convey to EPA's scientific cadre the urgency of our need for authoritative findings to support the regulations we were obligated to turn out to the beat of those timetables in the legislation.⁴³

If a Department of the Environment is established, the conflict between the need for information to support regulatory needs and the necessity to support long-term basic and applied research will remain. It will be critically important to achieve the proper balance between the two. Our recommendations below were developed with this concern in mind.

In recognition of the need to improve the scientific basis of its regulatory decisions, EPA has recently taken a number of steps to enhance the quality of its R&D programs. In responding to a recent report by an expert advisory panel, EPA is working to develop a more coherent science agenda, expand the use of science advisors within the agency, attract and retain outstanding scientists and engineers, and improve its interactions with other agencies and with academic and industrial research organizations.⁴⁴ These are important initiatives, and we applaud and support them. However, we believe that organizational innovations are also needed to advance EPA's R&D efforts. In addition, funding for ORD remains a chronic problem.

In 1984, the leaders of ten major environmental organizations and the CEOs of five major chemical companies wrote to Congressman Edward P. Boland, Chairman of the House Appropriations Subcommittee on VA, HUD, and Independent Agencies and strongly urged him to increase the fiscal year 1985 budget to EPA's Office of Research and Development by \$101 million more than the Administration's request. The group spoke of their "deep concern that the scientific base on which the agency's regulatory decisions are founded has been seriously eroded in recent years by severe cuts in the research and development budget of the EPA."⁴⁵ They pointed out that as measured in constant dollars, the ORD budget for FY 1985 was 15 percent less than in 1973 when ORD was created, even though Congress had passed several laws requiring additional R&D support during that period.

Today, severe funding constraints continue to limit ORD's effectiveness.⁴⁶ Despite substantial increases in R&D responsibilities ORD's budget, in constant dollars, has increased only modestly over the last decade, and because of severe limitations on full-time equivalents, a disproportionate share of the workforce at ORD laboratories is on-site contractors.⁴⁷ Although our report focuses on organizational issues, it is clear that organizational changes alone will not lead to improvements in the scientific capacity of EPA. Substantial funding increases will be required as well.

A National Ecological Systems Laboratory

An EPA National Ecological Systems Laboratory (NESL) should be formed by combining the six existing EPA R&D laboratories. A new headquarters site would be established for the national laboratory, with some of the existing laboratories continuing to operate as field sites under the direction of the national laboratory (see Figures 4 and 5, pages 66 and 67). The existing laboratories are located at Corvallis, Oregon; Duluth, Minnesota; Gulf Breeze, Florida; Narragansett, Rhode Island; Ada, Oklahoma; and Athens, Georgia.

This organizational arrangement would offer numerous advantages. First, it would create a critical mass of researchers and resources focused on understanding how environmental insults propagate through ecosystems. Research programs would be cross-media (air, water, terrestrial) and multidisciplinary in orientation.

Through the creation of such a national resource, EPA's Office of Research and Development should be able to attract a nationally prominent scientist-administrator to direct the laboratory. The director should report to the Assistant Administrator for Research and Development (or the Assistant Secretary for Research and Development in the proposed cabinet-level Department of Environment).

By creating this laboratory and attracting a prominent director, EPA

would bring into existence a powerful counterbalance to the constant pressure from the regulatory offices for continuous emergency response support. Given the critical needs of the regulatory offices in dealing with science- and technology-driven problems, it does not make sense to separate such a national laboratory from EPA or a Department of the Environment. It is necessary, however, to moderate the surges in demand for support from the regulatory offices.

Because of its critical mass and its perceived greater importance, a national laboratory should be better positioned to compete for limited resources. At this time, each of the six small R&D laboratories must compete individually for its funds and staff. Justification for increased support is difficult, given each laboratory's limited mission.

Finally, because of its improved stature, such a national laboratory would operate on a more equal footing with other major federal laboratories and leading scientific organizations.

The major disadvantage of combining the six EPA laboratories into a national ecological laboratory is the geographical distribution of the existing laboratories. This decentralization makes overall program management difficult, and it will take some time for the several parts of a new national laboratory to begin working in an integrated fashion. It will also require leadership to develop a vision of a truly national laboratory.

This problem goes to the heart of the nation's environmental dilemma—how to manage our national environmental resources while respecting the biodiversity encompassed in the nation. We think that it is more important to fashion an integrated ecological research program under a single administrative entity than it is to attempt to coordinate a highly decentralized system.

Some may argue that this experiment has already been conducted, and that the attempt failed. In 1973, EPA's Office of Research and Development reorganized all of its laboratories into three National Environmental Research Centers (NERCs). One NERC, placed under the direction of the Corvallis laboratory, encompassed most of the ecological effects and processes laboratories identified above. Communications and coordination among the laboratories and between the NERC headquarters and the Washington-based ORD headquarters were judged to be ineffective. In 1975, the NERCs were abolished, and the ORD laboratory structure returned to its present configuration.

In our opinion, the NERC experiment failed for several reasons. First, too much was attempted at one time, and the entire ORD organization was thrown into turmoil by the change. Second, the affected laboratories, which had previously operated quite autonomously under the Federal Water Pollution Control Administration, had not been prepared to function as

Figure 4. Current EPA Office of Research and Development Organization

Figure 5. Recommended Future EPA Office of Research and Development Organization

a team. Third, appointing one of the "peer" laboratory director as NERC director exacerbated the competitive tendencies in the laboratories. The proposal outlined above is designed to avoid these shortcomings, while trying to achieve an integrated program.

A National Environmental Monitoring Systems Laboratory

We propose that three laboratories in EPA's Office of Research and Development devoted to environmental monitoring be combined to form a National Environmental Monitoring Systems Laboratory (NEMSL). The three existing laboratories whose operations would be integrated are the Environmental Monitoring System Laboratories in Cincinnati, Ohio, and Las Vegas, Nevada, and the Atmospheric Research and Exposure Assessment Laboratory in Research Triangle Park, North Carolina. A headquarters site should be established for the NEMSL, with the existing laboratories continuing to operate as field sites under its direction.

The NEMSL would likely enjoy important synergies in monitoring technologies, analytical techniques, and statistical analysis, resulting in cost reductions, especially in cross-media monitoring efforts. The laboratory would also create a critical mass of researchers and resources focused on the technical foundations of environmental monitoring.

A significant challenge in combining the three EPA laboratories is overcoming the cultural differences among the three groups of scientists and engineers. Although the underlying chemistry is essentially the same, the groups evolved under separate air, water, and radiological pollution agencies. These differences can be overcome in time, with many synergies developing as operations are integrated. If a U.S. Environmental Monitoring Agency is established, as recommended later in this report, some or all of the activities of the NEMSL should be integrated with those of, or transferred to, the new agency.

A National Environmental Engineering Laboratory

We recommend that a single National Environmental Engineering Laboratory (NEEL) be established by combining the existing EPA Risk Reduction Engineering Laboratory in Cincinnati, Ohio, and the Air and Energy Engineering Laboratory in Research Triangle Park, North Carolina. The main laboratory, in North Carolina, would focus on air and energy engineering, and the Cincinnati component of the laboratory would focus on water-quality-related laboratory research and risk reduction. The NEEL should

work to advance the development of innovative environmental technologies and should forge relationships with industry in advancing toward common goals. The laboratory should work in conjunction with other federal departments and agencies to promote the development and diffusion of environmental technologies through a federal interagency Environmental Technologies Program discussed later in this report (see page 78).

A National Health Effects Research Laboratory

We recommend raising the EPA Health Effects Research Laboratory in Research Triangle Park, North Carolina, to the same status as the other three proposed EPA national laboratories. This would involve no significant change in the mission or staffing of this laboratory. The National Health Effects Research Laboratory should work closely with the National Institute of Environmental Health Sciences in planning and implementing research efforts.

Leadership and Cooperation

Each of the four proposed EPA national laboratories should be directed by an outstanding scientist or engineer of national stature who has the administrative skills necessary to direct programs of this scope. Every effort should be made to attract outstanding scientists, engineers, and other personnel to these organizations. Federal personnel should interact with individuals in the proposed Environmental Research Institutes (discussed in the next section) and in academia, nongovernmental organizations, and industry. In addition, it is essential that all four laboratories work closely with the proposed Institute for Environmental Assessment (see page 59) in evaluating environmental problems and alternative approaches to addressing them.

ENVIRONMENTAL RESEARCH INSTITUTES

■ *EPA should establish and support up to six major Environmental Research Institutes (ERIs) associated with academic institutions and nongovernmental organizations across the country.*

Today, the U.S. Environmental Protection Agency provides support to a set of four university-based Environmental Research Centers, or "centers of excellence." Each center specializes in a particular research topic of interest to the agency, receiving about \$1 million per year from EPA. The work of the centers is severely limited by inadequate funding. Furthermore, they

are typically organized as a component of a university or college, which presents both advantages and disadvantages.

EPA's Centers of Excellence program was initiated during the Carter administration, when zero-based budgeting was used to prepare EPA's budget submission to OMB. While there was some support for longer-term R&D in the regulatory offices, there was also intense competition for resources (both dollars and personnel) to meet the legislative requirements of the Toxic Substances Control Act and other laws and regulations. In addition, in the late 1970s no one in EPA was advocating larger centers. The regulatory offices viewed the use of funds for such centers as a diversion from the agency's mission, and R&D staff generally felt the centers program was diverting money away from the laboratories. The result was that the new centers initiative was approved but its budget was limited (about \$3 million in 1979). This funding was then used to establish multiple centers. Until recently, EPA supported eight centers at a funding level of approximately \$500,000 each.

In order for an environmental center of excellence to have significant impact, it must have adequate resources. Annual funding of \$500,000 is woefully inadequate to support the high-quality research teams needed to attack what are complex problems requiring multidisciplinary investigations. Subcritical funding results in the all too typical university center model—a few part-time faculty researchers, a few postdoctoral researchers, and a few graduate students. There are generally no full-time researchers and technicians, and equipment and instrumentation are shared, not dedicated.

To ensure its effectiveness in addressing the major environmental challenges facing the nation and the world, funding for each ERI should gradually rise to the level of \$10 to \$15 million annually for at least five years. In areas that require extensive support equipment, such as a research ship or sophisticated analytical instruments, additional funding should be provided. A full-time director, with world class credentials, and full-time researchers and technicians should make up the core of the institute, with faculty, postdoctoral students, and graduate students supplementing the full-time core staff.

ERIs should operate as EPA's principal extramural research units and should be complemented by a strong, well-funded extramural grants program. The ERIs should cooperate with the four EPA National Laboratories described above. The ERIs should focus on problem-oriented themes that require multidisciplinary research efforts that cut across the missions of the intramural National Laboratories. The institutes would thus function as more flexible, problem-oriented, multidisciplinary components of a Department of the Environment, thereby complementing the structured, discipline-oriented intramural National Laboratories. We envision a two-way flow of

personnel between the National Laboratories and the ERLs. This would give government scientists, engineers, and social scientists an opportunity to benefit from the career growth and educational opportunities offered in the university and nongovernmental setting. It would also enhance the National Laboratories by bringing some of the best scientists and engineers in the nation into government laboratories for extended periods.

After considering the views of a full range of experts within and outside the federal government, the EPA Science Advisory Board (SAB) should make recommendations to the EPA Administrator regarding the missions of the Institutes. The SAB should examine other similar research organizations operating through the National Institutes of Health and the Department of Energy and should make recommendations to EPA's Office of Research and Development as to how the best features of these organizations can be incorporated into EPA's institutes. The ERLs should then be awarded through a merit-based competition.

The ERLs' charter and organization are critical to their success. Institutes of the size envisioned here cannot function as academic subunits. While it is important for the institutes to have a close affiliation with a university (or with several universities), it is essential that they not operate as a component of a university, especially not as a component of a single college or department. The institutes could report to the research vice presidents or to the presidents of universities, or affiliated but autonomous not-for-profit institutes could be established outside, but nearby, the universities.

A number of organizations have demonstrated that they can effectively operate research institutes staffed with full-time employees under research administrations separate from academic administrations. Faculty and students move back and forth from the academic side to the research institute once the rules and expectations are negotiated and understood. The success of this approach seems to be highly correlated with the culture of the individual university.

A more recent trend is the establishment of affiliated not-for-profit centers. Many of these organizations have been created in the last decade as states have expanded their support of technology-driven economic development. One distinct advantage of such centers is that proprietary work with industry is greatly facilitated in the autonomous centers. Faculty and students can still do nonproprietary work within these organizations, but they would recognize that if they choose to work on proprietary projects, publication of their work may be delayed or precluded. If an ERL's mission requires close cooperation with industry, then the not-for-profit approach can operate in a typical business fashion, rather than following university calendars and administrative procedures.

ENVIRONMENTAL MONITORING AGENCY

■ *A new federal agency, the U.S. Environmental Monitoring Agency (EMA), should be organized by combining the National Oceanic and Atmospheric Administration, now within the Department of Commerce, with the U.S. Geological Survey, now within the Department of the Interior.*

Monitoring, mapping, inventorying, and forecasting with respect to the national and global environment are the cornerstones of federal environmental protection efforts. Documenting the characteristics of our air, land, and water resources is an enormous task that is now primarily undertaken by the U.S. Geological Survey (USGS), the National Oceanic and Atmospheric Administration (NOAA), and to a lesser extent the National Aeronautics and Space Administration (NASA) and the Environmental Protection Agency (EPA). The present and future missions of NOAA and USGS are more similar to each other than they are to the missions of the departments in which they reside. Consequently, we believe that these organizations should merge to form the U.S. Environmental Monitoring Agency (EMA).⁴⁸

The EMA should make use of data developed by NASA, EPA, the Fish and Wildlife Service, the National Institute for Environmental Health Sciences, and other agencies. It should maintain close ties with the National Aeronautics and Space Administration in an effort to link the Earth Observing System (EOS) and related environmental monitoring activities with its programs. Certain EPA activities, such as the Environmental Monitoring and Assessment Program (EMAP),⁴⁹ should be transferred into the EMA. The Agency's mission should include monitoring and evaluation of both natural processes and the social activities that are driving forces for environmental deterioration. These include consumption patterns, population growth, and use of modes of transportation. It should include biological surveys as well as geological surveys, mapping, and inventorying of both the biological and physical environment.

We believe that EMA should operate as an independent federal agency or as an entity within a Department of the Environment. Independence is important for an agency whose mission is devoted to monitoring the state of the environment and the progress of the nation in achieving environmental protection objectives. If a Department of the Environment is established at some point in the future, EMA could become a component of this organization; however, the agency should operate independently of the regulatory programs of a department. The EMA should maintain ties with the Institute for Environmental Assessment, providing the Institute with data to support its evaluation of national and global problems.

THE U.S. GEOLOGICAL SURVEY

The USGS has operated quite autonomously within the Department of the Interior. Over the years it has developed a reputation for excellence in its monitoring and research activities. USGS is responsible for gathering information and conducting analyses of land resources, minerals and energy resources, and geologic hazards. It is also responsible for studies in surface water and groundwater assessment and protection, toxic and nuclear substances hydrology, acid rain, and climate change hydrology. USGS is a key player in the federal government's Global Change Research Program, contributing to the effort to understand natural earth processes and the impacts of human activities on earth systems. It is also a leader in the development of information systems using advanced computer technologies. For example, it recently produced a prototype interactive CD-ROM science journal on the Arctic that has been widely acclaimed as a research and communications tool.¹⁴ About \$367 million was spent on environmental R&D in the USGS in 1992.

All of this work would continue in EMA. The 1879 charter of USGS sets forth its mission as the "classification of the public lands and examination of the geological structure, mineral resources, and products of the national domain."¹⁵ Today, more than 90 percent of the USGS program budget is devoted to monitoring activities in its National Mapping Program, Geologic Investigations, and Water Resources Investigations Divisions.

THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NOAA was established by President Nixon in 1970 at approximately the same time, and in the same manner, as the Environmental Protection Agency.¹⁶ The creation of NOAA had been recommended by the Stratton Commission, an independent panel of scientific experts assembled by Congress in the late 1960s to review the present and future needs of marine affairs, including oceanography, marine resources, ocean engineering, and education. Although the Commission had advised that it be an independent agency, two of the larger existing organizations that were brought together to form NOAA were located in the Department of Commerce, and it was ultimately placed there.

NOAA's Mission

NOAA's general mission is to monitor the global environment, predict environmental changes, and provide the public with environmental informa-

Box 4. Monitoring the Ocean Environment*

Long-term monitoring of the environment is nowhere more important than in the ocean. With its large heat capacity and its mobility, the ocean plays a key role in the climate system. Although our knowledge of the ocean and its processes is limited because of the vast range of time and space scales involved, we do know that the ocean acts regionally as a buffer and affects the coastal climate. Globally, the ocean acts as a heat source that forces atmospheric convection and wind and drives weather patterns.

With new technical and computer modeling techniques, a number of major international research programs are being carried out to develop an adequate understanding of the ocean and its interaction with the atmosphere and continental margins. One example of success in this research is that scientists are now producing forecasts of the climate anomalies due to El Niño. But information on long-term changes is lacking. Consequently, the ability of scientists to model and predict changes in the ocean on a broader scale is limited. One proposal to facilitate advances in this area is a Global Ocean Observing System (GOOS), the oceans component of the internationally planned Global Climate Observing System. With adequate support and institutional infrastructure, it is possible that by the end of this decade investigators will be able to maintain an ocean model that could be used for forecasts of ocean eddies, El Niño, and dispersion of pollutants, and for other practical purposes.

It is important to begin as soon as possible to put in place the systems that can provide global information; such systems include satellite-based instruments, automatic fixed and floating buoys that transmit information to shore, acoustic monitoring systems, and the necessary data links.

Institutional support is the key to the success of GOOS. At present NOAA is the lead agency, with strong contributions from the NSF, which has been the key supporter of global research programs. The DoD, DoE, and USGS also provide support for significant elements of global observing systems. A new U.S. Environmental Monitoring Agency would provide a strong institutional home for a program such as the GOOS.

* D. James Baker contributed to this box.

tion and forecasting. It is charged with monitoring and data collection and analysis for the oceans and atmosphere, including weather forecasting and coastal and ocean research (see Box 4). Two pieces of NOAA scientific research—a time series of increasing atmospheric carbon dioxide levels over the past three decades, and modeling of greenhouse gases and their role in global warming—have been praised by both scientists and policymakers.

Because of its technical expertise, it has become one of the premier

agencies involved in the Global Change Research Program and has shaped much of the current debate and information about global climate change. NOAA also has taken the lead in researching the environmental effects of the Persian Gulf War oil spills on the western shore of the Persian Gulf,¹³ and it has sponsored research indicating that CFC substitutes may cause more damage to the stratosphere than originally postulated.¹⁴

Although NOAA has contributed significantly to atmospheric and oceanic science, its separation from other basic research environmental R&D agencies and its location within the Department of Commerce have resulted in less visibility than that of other environmental agencies. Furthermore, its current position has made it vulnerable to budget cuts.

Weaknesses and Isolation

Today, NOAA suffers from several weaknesses that are directly related to its location within Commerce and its consequent isolation. First, NOAA's mission includes a combination of research and environmental services. In recent years, its mission has evolved away from basic research to emphasize "environmental services" in business and economics.¹⁵ This shift in philosophy impedes NOAA's ability to plan and carry out environmental R&D. Commerce is a business-oriented department created to help American industry become more competitive, to promote trade and export in American goods and services, and to speed up commercialization of new technologies. As a science agency, NOAA's location within the Department of Commerce makes little sense.¹⁶ Although NOAA accounts for more than half the Department's budget, it does not command half the Secretary of Commerce's attention.

Second, NOAA's funding has fluctuated greatly over the past decade. During the 1980s, for example, the Reagan administration proposed 10 percent cuts in NOAA's funding each year. Congress resisted these cuts, and NOAA's budget remained more or less constant throughout the decade. However, because of inflation, its budget in real dollars actually declined.¹⁷ Although the recent Global Change Research Program has resulted in a reversal of that trend, the lack of adequate funding during the 1980s caused NOAA to defer many capital improvements that were needed to maintain the technical infrastructure that supports its environmental R&D efforts.¹⁸

Third, NOAA has failed to establish strong ties to universities and to the private sector.¹⁹ Universities and private businesses could greatly assist the agency in carrying out its environmental research agenda and in building a strong constituency for the agency.

ELIMINATING WEAKNESSES, CAPITALIZING ON STRENGTHS

The creation of an independent Environmental Monitoring Agency would capitalize on the strengths of both USGS and NOAA. Inefficiencies in overlapping or duplicated capital investment and monitoring activities could be eliminated. Existing weaknesses resulting from their organizational locations, particularly NOAA's, could be overcome. And, perhaps more important, monitoring and analysis of all the earth's resources—oceans, atmosphere, and terrestrial—would be brought together under one agency, which could approach them with a comprehensive, unified perspective. We believe that the EMA should operate initially as an independent federal agency; however, if a Department of the Environment is established, it would be advantageous to make the EMA a component of the Department.⁶⁰ The proposed federal environmental R&D infrastructure incorporating the changes we have recommended is shown in Figure 6.

NATIONAL CENTER FOR ENVIRONMENTAL INFORMATION

■ *A National Center for Environmental Information (NCEI) should be established within the proposed U.S. Environmental Monitoring Agency.*

A National Center for Environmental Information should serve as a focal point for the storage and retrieval of information generated from a range of sources, primarily federal departments and agencies, but also state and local governments, academia, industry, and nongovernmental organizations. The center should be responsible for developing policies to ensure that environmental data are properly stored and are readily accessible to all users.

The center should not be responsible for monitoring activities—it should work, however, to ensure that the data developed by federal investigators and those in the private sector are stored in compatible formats, and that they are properly catalogued. In most cases, individual federal programs, agencies, and departments would continue to maintain their own databases. In this sense the center would function primarily as an electronic access point and would not duplicate or supersede existing data storage capabilities. For example, the center would not duplicate the extensive toxicological information available at the National Library of Medicine, but would inform potential users of the information that is available and explain how to access it.

Efforts to coordinate the development, use, sharing, and dissemination of geographic data are already under way through the Federal Geo-

Figure 6. Proposed Federal Environmental R&D Infrastructure

graphic Data Committee. Coordination activities of this kind will become increasingly important as massive quantities of data on the state of the environment are generated in the years ahead.

One important activity of the National Center and the Environmental Monitoring Agency should be the development of national biological inventories, a concerted effort to document the nation's plant and animal resources.⁶⁴ Such information is critical in documenting the impact of pollutants and other forms of disruption on ecosystems, in evaluating biological diversity, and in monitoring the progress of environmental protection efforts.

ENVIRONMENTAL TECHNOLOGIES PROGRAM

■ *A federal interagency Environmental Technologies Program should be established to promote and support the development of advanced technologies by federal agencies, universities, industry, and nongovernmental organizations.*

Responding to the environmental challenges of the decade ahead will require the development of a full range of advanced technologies to minimize waste, enhance energy efficiency, promote agricultural productivity, and limit the release of pollutants into the environment. These include biotechnologies that can limit the use of traditional toxic pesticides, minimize the application of fertilizers, and enhance the productivity of crops. Programs supporting the development of environmental technologies are under way throughout the federal government.⁶⁵ Federal agencies, particularly EPA, must modify their regulatory procedures to encourage these kinds of technological innovation,⁶⁶ but regulatory incentives alone are not sufficient.

We recommend the establishment of a federal interagency Environmental Technologies Program that would provide support to federal agencies and the private sector through grants, loans, and cooperative agreements to promote the development and diffusion of these technologies. EPA, or a Department of the Environment, should function as the lead federal agency, providing funds to other agencies, industries, academic institutions, and nongovernmental institutions as appropriate to support new and existing technology development programs. Government support should primarily be for precompetitive, general technologies⁶⁷ or activities leading to useful nonproprietary knowledge—knowledge that is broadly applicable, but whose potential applications can be predicted, with some degree of accuracy, in advance.⁶⁸

EPA has experience in administering programs of this kind. In the

middle to late 1970s, the Federal Interagency Energy/Environment R&D Program successfully coordinated federal R&D efforts, with EPA providing funds to other federal agencies through interagency agreements. A similar program focused on technology development would help ensure an integrated federal approach to technology development. Congressman Joseph P. Kennedy has introduced legislation to establish a program of this kind.⁶⁶

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

■ *The National Aeronautics and Space Administration should closely link its environmental monitoring activities with those of other federal departments and agencies and of other nations.*

Satellite-based earth observing systems make a fundamental contribution to understanding, describing, and monitoring the biosphere. Such satellites can support research efforts dealing with problems of climate change and ozone depletion, operational systems such as weather forecasting, and commercial interests in forestry, agriculture, mineral resources, and land use planning. But despite broad international interest and widespread activities, space-based remote sensing has followed an erratic course. In part, the imperfections of this approach have been due to the high cost of long-term remote sensing from space. Given the wide interest in remote sensing, it is essential to make future earth-observing systems as efficient as possible. Over the long term, it seems most efficient to procure a standard satellite and operating system worldwide. This would involve merging and coordinating governmental and commercial interests with new and innovative intergovernmental and private arrangements (see Box 5).

Over the years, various alternatives to an intergovernmental coordinating mechanism have been suggested as part of the efforts to reduce the cost of existing and future government and commercial observing systems. One possibility would be to construct an international network of earth-observing systems, analogous to the successful INTELSAT and INMARSAT of the telecommunications world, with all countries benefiting from improved, more reliable, and less costly services.

A wide range of institutions use remote sensing, including international, national, and state agencies; commercial firms; academic institutions; and individuals. These users receive data from two sources: satellite systems funded and operated by governments and private-sector operations. The market for land data alone has proven insufficient to sustain a remote sensing program. In many cases, commercial firms prefer to use aircraft-based remote sensing to meet their specialized needs, rather than rely on

Box 5. International Approaches to Space-Based Remote Sensing

Difficulties with remote sensing arrangements abound. A large gap in the satellite monitoring of stratospheric ozone depletion is likely to open in 1995, when the U.S.-led Upper Air Research Satellite (UARS) stops functioning. This leaves a three-year gap until the earliest possible launch of a similar satellite as part of the U.S.-led Earth Observing System (EOS). But the latest plan for EOS from the U.S. National Aeronautics and Space Administration would further delay the first launch of instruments to monitor changes in stratospheric ozone. NASA is preparing plans that call for the launch of EOS atmospheric chemistry experiments in 2000 or 2002, rather than, as originally planned, in 1998. During this period, other satellites will carry total ozone mapping spectrometers, which measure the total amount of ozone in the column of atmosphere beneath a satellite. But it is also important to record in detail the chemical changes occurring in the stratosphere.

The situation with respect to climate monitoring is in many ways worse, largely due to the complexity of the systems that must be monitored. Again, EOS will provide valuable data, but there will be gaps in the monitoring of important parameters. Problems have also plagued the gathering and dissemination of surface data, which is of substantial commercial interest. The U.S. Landsat program includes as one of the principal requirements in granting licenses to operators a provision that data be made available on a public nondiscriminatory basis.

Fifteen nations have built ground stations to receive and process Landsat data, which is transmitted by a radio link from a polar-orbiting spacecraft. These stations cost about \$20 million to build, and about \$3 million each year to operate. Two spacecraft now in orbit are coming to the end of their service life. A sixth replacement spacecraft has been much delayed, and it is inevitable that there will be an interruption in service for several years. As a consequence, users around the world are modifying their ground stations to operate with the French Spot system, which provides similar information.

In 1987, the Soviet Union began to offer high-resolution photographs obtained from its KFA-1000 and other satellites to customers outside the Soviet bloc at a competitive price. The European Space Agency also intends to provide Landsat-type data. A number of other countries, including Japan, India, Indonesia, and Brazil, are developing or have recently launched remote sensing satellites.

In view of the gaps in data coverage and overlaps in land sensing data, several suggestions have been put forward to attempt to correct the situation. Prime Minister John Major of the United Kingdom has suggested that the problem could be addressed by the Committee on Earth Observing Satellites (CEOS), comprised of members of most of the countries with an interest in remote sensing satellites. The committee's objectives are to optimize the benefits of space-borne earth observation through cooperation of its members in mission planning and to develop compatible data products, formats, services, applications, and policies.

satellite information that is available to all. It appears, however, that governments themselves could constitute a market, based on their own needs for land, meteorological, and oceanographic remote sensing services. Other users would add to this market. With a large enough market, viable private-sector operations could be established to provide data to all users.

NASA's Earth Observing System (EOS) is designed to evolve over a 15-year period into a comprehensive system to collect and distribute remote sensing data on the atmosphere, oceans, and land surfaces. The cornerstone of the EOS effort is a group of space-based observatories that is now scheduled to begin collecting data shortly after the turn of the century. The data will be processed, stored, and distributed to researchers through the EOS Data and Information Systems (EOSDIS). EOSDIS will be an extraordinarily large data system, and, given its importance in monitoring the global environment, it is critically important that it be carefully designed and that it take advantage of new and emerging advanced technologies.⁶⁷ We believe that EOSDIS should be linked closely with the monitoring data systems of the proposed Environmental Monitoring Agency.

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

■ *The new research and training programs at the National Institute of Environmental Health Sciences should be expanded, and the Institute should establish closer ties with EPA's health research program.*

The National Institute of Environmental Health Sciences (NIEHS) bridges the basic research typical of NIH and academic biology and the more applied toxicological and epidemiological research needed for hazard identification and risk assessment. NIEHS recently undertook an internal reorganization to encourage multidisciplinary integrated research efforts.⁶⁸

We believe that the Institute's research programs, both intramural and extramural, should expand steadily over the next decade. In particular, we recommend that NIEHS-sponsored training programs, now about \$10 million, be doubled over the next four years to provide adequate numbers of well-trained environmental health scientists to industry, academia, and to the government research and regulatory agencies.

In 1988, the Public Health Service released an extensive study of the environmental health work force that presented a series of recommendations to help ensure that future personnel needs can be met.⁶⁹ Furthermore, research programs at NIEHS and EPA are directed at many common goals. We suggest that NIEHS and EPA's Office of Research and Development, particularly the Health Effects Research Laboratory (or the proposed

National Health Effects Research Laboratory) forge new cooperative research agreements. Both the Health Effects Laboratory and NIEHS are located in Research Triangle Park, North Carolina, which should make it easier to build on NIEHS's basic research strengths and EPA's applied research capabilities.

DEPARTMENT OF THE INTERIOR

■ *The Department of the Interior should develop a long-range plan for its environmental R&D activities and should work to integrate and focus its programs in the context of clearly defined goals.*

The Department of the Interior is the caretaker of the nation's public lands and waterways. It is a large department in which environmental research and development play a relatively small role. Thus, while it carries out environmental research in all five of its divisions, its programs are decentralized and are not coordinated across the agency. The department's environmental R&D programs lack planning and coherence. Its research programs are underfunded and reactive, and little effort is directed to coordinating research across programs within the department. A long-range plan for environmental R&D would help direct department resources towards well-defined objectives.

NATIONAL PARK SERVICE

■ *The National Park Service should establish a strong environmental research and monitoring program to build the knowledge base necessary to protect the resources of the National Park system.*

Over the past 30 years the Park Service has been advised on several occasions of the value of establishing a substantive environmental research program. In 1963, the NRC noted that "Research by the National Park Service has lacked continuity, coordination, and depth . . . has been marked by expediency rather than long-term considerations . . . has lacked direction . . . has been fragmented."⁷⁰ In the years that followed little significant improvement in research programs resulted, and in 1977 the National Research Council concluded that

the National Park Service has reached a time in its history, and in the history of the nation, when science and research should be given a much greater and clearly recognized responsibility in policymaking, planning, and operations.

Sear-of-the-pants guesses in resource preservation and management are open to challenge and do not stand up well in court or in the forum of public opinion.⁷¹

This year, an NRC report pointed out that, after almost a dozen reports over the past 30 years by various groups, little progress has been made in establishing a credible research program within the Park Service. The latest report calls for an explicit legislative mandate for a research mission in the National Park Service, including separate funding and reporting autonomy for the science program. The program should include a chief scientist and an external science advisory board.⁷²

We support the NRC's recommendations for building a substantial research program within the National Park Service. The little progress made over the past 30 years in building a credible research unit makes it clear that establishing such a program will require stronger backing from Congress, the President, and the Secretary of the Interior.

BUREAU OF LAND MANAGEMENT

■ *The Bureau of Land Management should expand its environmental monitoring and technology programs and seek the assistance of other federal agencies in devising land use, biological resources management, waste management, and monitoring programs to protect public lands and to ensure their productive use in the future.*

The Bureau of Land Management (BLM) is responsible for managing 272 million acres of public lands. The Federal Land Policy and Management Act of 1976 requires that these multiple use lands be managed in the long-term public interest without impairing productivity or environmental quality.⁷³ However, these lands have not been properly maintained, and the biological resources have not been protected. Improper use and carelessness has resulted in widespread contamination of the environment and unwarranted degradation of grasslands and soil. BLM's Hazardous Materials Management Program attempts to mitigate only some of these problems.

As recently described by the National Research Council, the Hazardous Materials Management Program is dependent on three kinds of technology to advance its goals: advanced monitoring technologies to locate and monitor waste sites, technology to clean up hazardous substances, and technology to manage hazardous materials.⁷⁴ Many of these technologies and the strategies for using them are available from the private sector or other government agencies. BLM should take advantage of these capabilities, and

those of other agencies, in developing its waste management, land use, biological resources management, and monitoring programs.

DEPARTMENT OF AGRICULTURE

■ *The Department of Agriculture should continue to strengthen its environmental R&D by following the recommendations recently made by the National Research Council and the congressional Office of Technology Assessment that call for a substantial increase in funding for competitive research grants and for a more structured, integrated, and coordinated R&D planning system.*

USDA has an extensive and longstanding agricultural research program, established over a century ago. It is centered in the department's Agricultural Research Service, although the Cooperative State Research Service (CSRS) and the Extension Service (ES) also carry out research or are involved in the delivery of research to end users and the practical application of research results. The agricultural research program is coupled with a far-reaching extension system that links 74 land grant universities and more than 31,000 county offices. The department's research efforts have been successful in some areas; however, environmental research and development, with the exception of soil conservation and some other programs, is a relatively recent venture.

The goal of USDA's agricultural R&D is to increase agricultural productivity. Its accomplishments are impressive and have contributed to making U.S. agricultural programs among the most productive in the world. With less than 7 percent of the world's land and less than 5 percent of the world's population, the United States' farmers produce 12.6 percent of the world's agricultural commodities (by value); one hour of farm labor produces nearly 8 times as much food and crops today as it did in 1947, output per acre is 40 percent higher today than it was in 1967, and each farmer in the United States produces enough food for a hundred people.

Today, USDA's research is increasingly concerned with the environmental consequences of farming and agricultural technology (for example, the effects on wetlands conservation of pesticide use) and USDA is conducting research in areas such as sustainable development, water quality, biotechnology, and food quality and safety. To help understand the potential effects of global climate change, ARS has become an active participant in the United States Global Change Research Program and is developing a strategic plan for assessing the long-term and short-term effects of climate change on American agriculture.

USDA research has been studied in depth by both the National

Research Council's Board on Agriculture and the Office of Technology Assessment (OTA) of the United States Congress. In 1989, the NRC issued a report, *Investing in Research: A Proposal to Strengthen the Agricultural, Food, and Environmental System*, which pointed out that agriculture productivity and environmental quality go hand-in-hand.⁷⁵ The NRC identified several issues of concern, including contamination of surface water and groundwater by natural and chemical fertilizers, pesticides, and sediment; the continued abuse of fragile and nutrient-poor soils; and suitable disposal of industrial and agricultural wastes.

The NRC panel recommended a major increase in support for research related to the contamination of surface water and groundwater by contaminants from agricultural production. It also recommended additional research on soil erosion in order to develop new ways to "estimate erosion, decrease displacement of soils by wind and water, and develop federal policies for conserving fragile lands," and expanded research programs related to the minimization of agricultural wastes, the development of new waste recycling technologies, and improved systems for ecologically safe waste disposal systems.

The NRC also called for expanding research support for agriculture, food, and the environment by \$500 million annually, with the bulk of this increase supporting competitive grants administered through USDA's Competitive Research Grants Office. It proposed expanded competitive grant programs in six areas, including natural resources and the environment. This program area should focus on "fundamental structures and functions of ecosystems, biological and physical bases of sustainable production systems; minimizing soil and water losses and sustainable surface and groundwater quality; global climatic effects on agriculture, forestry, and biological diversity."

In its study, OTA concluded that broad changes in the basic organizational system of USDA are needed to improve agricultural research. It pointed out that USDA lacks a research mission statement, short-term and long-term planning, mechanisms for setting priorities, and appropriate funding. In OTA's view, the best solution for improving agricultural research is increased appropriations for research combined with a mission-oriented approach to R&D. The major components of this system include a clearly articulated, mission-oriented agricultural research and extension policy; a structured, integrated, and coordinated planning system; and a combination of formula and competitive grants.⁷⁶

The 1992 Appropriations Committee hearings suggest that Congress has largely adopted the initiative suggested by the National Research Council. In 1992, the Cooperative State Research Service requested \$125 million in research funds, of which approximately 12 percent was targeted to environmental research. However, many of the structural and organizational prob-

lems identified by OTA still exist. The Task Force endorses the conclusions and recommendations presented by the NRC and OTA and encourages USDA to take deliberate steps to continue to strengthen its environmental R&D programs.

DEPARTMENT OF ENERGY NATIONAL LABORATORIES

■ *The R&D activities of the Department of Energy National Laboratories should be evaluated to determine their potential to make future contributions to national and international environmental R&D programs.*

As recognized in the Carnegie Commission's report E1: *Organizing for Environment, Energy, and the Economy in the Executive Branch of the U.S. Government*,

institutions must be designed to embrace environmental, energy, and economic goals harmoniously and coherently and to perform at the highest capability the functions of securing the knowledge base, assessing impacts, and formulating and implementing policies with both national and international dimensions.⁷⁷

The Department of Energy has a large environmental R&D program, and its national laboratories have played and should continue to play a central role in the department's research activities. In keeping with the new vision called for above, the missions, organizational positions, and activities of DoE's National Laboratories should be reexamined and directed toward environmental, energy, and economic objectives.

The Department of Energy's R&D efforts are supported by several national laboratories, including Oak Ridge (in Tennessee), Argonne (in Illinois), Lawrence Livermore (in California), Los Alamos (in New Mexico), and Brookhaven (in New York). Historically, the primary mission of these laboratories has been to design and provide prototypes of nuclear weapons and reactors and to support the mission of the Department of Defense. In carrying out this mission, the laboratories have developed unique capabilities that can contribute to the nation's environmental protection efforts. For this to happen, however, fundamental operational changes will have to be made.

Some of the national laboratories already have environmental R&D programs in place. For example, Argonne National Laboratory is working in the area of land use and restoration; Brookhaven National Laboratory has conducted research in acid rain for many years and houses a significant program on greenhouse gases; Oak Ridge National Laboratory is developing

advanced waste treatment technologies; and the Pacific Northwest Laboratory has developed technologies to reduce toxicity of wastes. In 1990, Lawrence Livermore National Laboratory established an Environmental Technology Program to develop and evaluate innovative technologies to aid in environmental restoration and waste management.

The national laboratories also have extensive computational facilities and the ability to undertake large-scale field research and to conduct studies of nonlinear, complex systems. These capabilities can be applied in several key environmental protection problem areas, particularly the cleanup of hazardous waste and the storage and analysis of environmental monitoring data. A Task Force of the Secretary of Energy Advisory Board (SEAB) has examined these and other issues in the context of the future of the National Laboratories and has made recommendations for programmatic changes in a recent report.⁷⁸

CHEMICAL AND NUCLEAR WASTE DISPOSAL

The DoE and other federal agencies must address massive problems of chemical waste disposal. The department is also facing the daunting task of cleaning up nuclear waste not only at nuclear facilities, but also at the national laboratories themselves. The laboratories can contribute both to locating wastes through advanced seismic and electromagnetic techniques and to rendering them less dangerous. Once waste has been located, a promising approach to cleanup is bioremediation, which involves the development and deployment of microbes or bacteria that attack specific wastes, ingest them, and convert them to a less formidable threat. Although bioremediation is a useful mechanism to attack chemical wastes, it is of limited use in mitigating the radioactive waste problem, and novel methods to address this problem must be devised.

Successful implementation of bioremediation is closely coupled to an understanding of the ecology of underground life. The ecology of the large subterranean biomass is poorly understood, although some data have been developed, primarily by the petroleum industry. The national laboratories, through their experience in conducting drilling programs, coupled with their substantial expertise in molecular biology and related sciences, have the capability to analyze this important but largely unknown part of the biosphere and to conduct the research programs needed to implement operational bioremediation. The activities of the DoE laboratories in this area could do much to enhance the capabilities of other civilian and defense agencies facing massive cleanup problems.

STORAGE AND ANALYSIS OF ENVIRONMENTAL MONITORING DATA

The national laboratories can also make important contributions to federal environmental R&D programs in the storage and analysis of environmental monitoring data. As research on global change proceeds, it will be essential to couple data from broad-coverage satellite observations with data from the more narrow coverage provided by remote sensing from the ground and from aircraft. The national laboratories have extensive experience in building and operating satellites and in reducing the data they generate. The laboratories have proven ability to design and build instruments, to integrate these instruments within spacecraft, and to design the data processing component essential to the success of a space-based mission. The extent of this experience is not widely known because these space-related efforts have been conducted in support of national security programs. While NASA undoubtedly will continue to have primary responsibility for much of the space effort supporting studies of global change, these capabilities make the national laboratories a resource for quick-reaction, opportunistic attempts to solve specific problems.

POLITICAL CHALLENGES

The integration of the DoE national laboratories into environmental research and development programs presents difficult political challenges. First, many view the laboratories' historic mission as incompatible with environmental concerns. Moreover, since the design of nuclear weapons may continue to be the laboratories' primary mission, it could be difficult to focus the attention of top management on environmental research and development, which might be deemed a secondary or tertiary concern. Second, to date, the laboratories have achieved only partial success in developing expertise in the environmental sciences to complement their considerable expertise in engineering, physics, chemistry, and biology. Third, the laboratories tend to be most successful when solving problems that require large, coordinated efforts. While important aspects of environmental problems are of this character, many issues can be best addressed by the individual investigator working in the laboratory or by the individual modeler analyzing well-defined problems.

In spite of these potential difficulties, we believe that the national laboratories can and should devote substantially more attention to R&D supporting the nation's environmental protection objectives, and that the obstacles facing the national laboratories in making this mission transition can be surmounted. DoE has demonstrated that it can modify its mission to make important contributions to the mapping of the human genome.

Certainly it can modify its mission to address the major environmental challenges now facing the nation.

DEPARTMENT OF DEFENSE

■ *Department of Defense environment-related research and development efforts should be integrated with those of other federal departments and agencies. Alternatively, some of these activities could be transferred to environmental R&D programs within other departments and agencies.*

The Department of Defense (DoD) laboratory structure possesses significant capabilities for conducting environmental research. In fact, the department has funded natural science research targeted on environmental issues for many years. The Office of Naval Research has played a major role in developing the nation's oceanographic capabilities, and the Army, through a variety of programs, has funded important computer-based research as well as studies of the lower atmosphere. For many years, the Air Force has maintained a sizeable program in upper atmospheric research. Like the Department of Energy, however, the Department of Defense is responsible for a substantial proportion of the nation's hazardous waste, and it has, until recently, devoted few resources to this problem.

Environmental research within the Department of Defense is, as it should be, highly mission-oriented. However, new opportunities are developing for the department to contribute directly to the research activities of civilian federal agencies. DoD is facing major cleanup problems at its bases and installations. Research directed at solving these problems should contribute as well to the national hazardous waste cleanup effort centered in EPA's Superfund activities. The Defense Department also faces the major task of disposing of old chemical weapons, and the development of technologies to deal with obsolete highly toxic substances will have applicability to the disposal of other hazardous waste. In addition, the services and various agencies of the Defense Department have recently begun to focus on ways to minimize waste. Here again, technologies, procedures, and manufacturing systems that conserve resources could be shared with the civilian agencies.

Future environmental protection efforts will depend heavily on monitoring and mapping systems. The Defense Mapping Agency produces databases on topography that are essential to the implementation of geographic information systems. Similar databases are vital to addressing many environmental concerns. Defense databases could be expanded and, in some cases, integrated with those of civilian agencies to enhance national and international environmental monitoring efforts.

The recently initiated Strategic Environmental Research and Development Program (SERDP) presents new opportunities for further development of research and technology within the Defense Department. SERDP is intended to bring the department's technological capabilities to bear on environmental problems. Initially, most funds will be directed toward environmental cleanup activities, but in the longer term some resources are likely to be used on problems related to global climate change.

As a key component of the SERDP, the U.S. Army Corps of Engineers plays an important environmental R&D role at DoD. The Corps also maintains an active wetlands study. The Office of Naval Research in the Department of the Navy supports a sizeable basic research program, particularly in the oceanography area. It devotes about \$500 million per year to research related to such subjects as tides, meteorology, and ocean pollution.

In pursuit of its mission, the Defense Department has contributed to the development of remotely piloted vehicles (RPVs), which can be employed in a variety of atmospheric studies. RPVs can provide a critically needed adjunct to satellite-based remote sensing by maintaining continuous observations at critical altitudes such as the tropopause, where satellites are less effective. In addition, RPVs can conduct *in situ* sampling. This capability could yield information on the abundance and nature of aerosols, which strongly influence the radiative balance within the atmosphere and play a key role in cloud formation.

The integration of the Defense Department's environmental research and technology development programs into the federal environmental R&D effort requires improved coordinating mechanisms. At present, the civilian agencies are unfamiliar with DoD's capabilities. By requiring the Departments of Defense and Energy to develop joint programs in consultation with the Environmental Protection Agency, the SERDP has taken a step toward achieving this more effective collaboration. Both the Office of Science and Technology Policy and the Office of Environmental Quality can contribute to the coordination process by analyzing DoD capabilities and looking for areas of potential interaction with the R&D programs of civilian agencies. It would be useful to examine whether some DoD programs might operate more effectively under other departments and agencies.

HAZARDOUS WASTE R&D

■ *A larger proportion of the funds devoted to the cleanup of hazardous waste at federal facilities should be directed to research and development.*

In fiscal year 1992 alone, \$4.3 billion was directed to environmental restoration and waste management at atomic weapons production facilities.

Yet very little of this money was earmarked for research and development. The consequence of this shortsighted policy is that tremendous opportunities to learn from the cleanup process are being lost. We believe that a substantially larger percentage of environmental restoration and waste management funds should be directed to R&D. This proportionally small investment can lead to major improvements in our understanding of the impacts of wastes on the environment and in the development of technologies to aid in waste cleanup.

Hazardous waste remediation efforts at federal facilities should be coordinated with the EPA Superfund Innovative Technologies (SITE) program and other federal efforts. In addition, a comprehensive comparative analysis of federal facility cleanup funding (\$9.4 billion in federal support for FY 93) and Superfund cleanup program funding (\$1.7 billion in federal support in FY 93) should be undertaken to determine if the current 5:1 ratio of support for these activities is appropriate.

6

LINKING AND COORDINATING PROGRAMS

Because of the global nature of many environmental problems, U.S. environmental R&D programs must operate in concert with those of other nations. Industrialized countries must share the burden of finding innovative solutions to the challenges of today and tomorrow. Furthermore, the federal environmental R&D effort will operate most effectively if it is linked closely with complementary programs in academia, nongovernmental organizations, and industry. The recommendations that follow suggest ways to improve these interactions—both national and international.

■ In order to strengthen the link between environmental R&D and policy development, assessment capabilities across federal agencies should be expanded. Furthermore, U.S. environmental R&D programs should be coupled more closely with those of other nations. Greater cooperation among scientific disciplines and among federal, nongovernmental, and industrial research programs should be encouraged.

STRENGTHENING LINKAGES

■ *The linkages between environmental R&D and policy development should be strengthened, and the federal government should substantially increase its support of multidisciplinary policy studies and assessments designed to forge and evaluate these linkages.*

The development of effective environmental policy requires interaction among the natural sciences, economics, political science, and law, among others. To date, legal considerations have dominated policy development. Lawyers have codified their interpretation of the results of natural science research into various legal prescriptions both in statutes and in regulations. At certain stages, the economic consequences of these prescriptions are examined, but often in a cursory and *post hoc* way. Social and political considerations are weighed only at the very end of the process, when laws must be passed or regulations issued and adopted.

Currently, federal agencies are focusing their environmental R&D efforts on the natural sciences. There has been minimal support for research on the economic, political, social, and legal implications of environmental issues. An even smaller fraction of R&D funds has been directed to studies that examine the interconnections between these various disciplines and the ways in which they can be enhanced. Yet investigating alternatives, raising issues, and developing new conceptual approaches to address them are all important ingredients in developing a framework for environmental policy. At present, no single institution has directed funding authority to pursue these avenues of multidisciplinary research, although such studies do proceed in a few places throughout the United States and abroad, primarily with the support of private foundations.

Federal officials and their staff have little time to consider complex policy issues and to devise alternative strategies to address them. Translating research results in the natural sciences into effective environmental policy requires the capability to link the natural sciences with economics, political science, and law. A prerequisite for developing this capability is the assurance of stable and adequate funding. We recommend that the federal government devote a larger percentage of total environmental R&D dollars to policy research and assessment, including studies of the economic, social, legal, and political aspects of environmental problems; regional, national, and international perspectives should be taken into account. These studies should be undertaken within or through the proposed Institute for Environmental Assessment, described above (page 59), as well as through the policy evaluation offices of departments and agencies, with major funding devoted to support extramural studies in academic and nongovernmental institutions.

INTERNATIONAL COOPERATION

- *The United States should couple its environmental research and development efforts more closely with those of other nations.*

It is in the interest of the United States to develop more effective R&D collaborations with other nations in order to achieve environmental goals. In some R&D areas other nations have extensive experience in addressing certain problems, and we can learn from their efforts. Other nations have limited environmental R&D activities and can learn from our programs. The U.S. Agency for International Development (AID) supports environmental programs, some of them R&D programs, in more than 90 countries at a level of more than \$400 million per year.⁷⁸ Total U.S. assistance for economic, humanitarian, environmental, and development purposes was more than \$11 billion in 1991.⁷⁹

How can the United States encourage other nations to use newer, innovative technologies, especially where older, less environmentally sound technologies are currently in use? Can a system be devised to share technology and to foster collaborative R&D efforts? Can the international R&D community work together to devise indicators of environmental quality and programs to monitor these indicators? Certain scientific disciplines are already forging international relationships to answer these kinds of questions. How can we encourage such interactions in other scientific disciplines? These are some of the important questions facing policymakers.

INVOLVEMENT OF INTERNATIONAL ORGANIZATIONS

International agencies, including the United Nations Environment Program and specialized agencies such as the World Meteorological Organization, as well as key nongovernmental scientific organizations, are promoting a range of international collaborative R&D efforts. The International Program on Chemical Safety within the World Health Organization (WHO), for example, provides updated assessments of the health risks posed by important toxic substances, aids in research and training coordination, and disseminates information world wide. WHO programs like this make important contributions to public health throughout the world and should be strongly supported by the United States. The National Institute of Environmental Health Sciences (NIEHS) makes a substantial annual contribution to this program, but this level of support may be reduced in the future.

Another example of international collaboration is the International Conference on an Agenda of Science for Environment and Development into the 21st Century (ASCEND 21). Sponsored by the International Council of Scientific Unions (ICSU), in cooperation with other nongovernmental

organizations, ASCEND 21 stressed the importance of a new international partnership in environmental research and underscored the importance of the precautionary principle. This principle calls for avoiding disturbances of earth systems because of the potential for unexpected consequences when altering poorly understood systems. ASCEND agreed on the nature of major global environmental challenges and identified several high-priority areas for cooperative international research. These include population and per capita resource consumption; depletion of agricultural/land resources; inequity and poverty; climate change; loss of biological diversity; industrialization and waste; water scarcity; and energy consumption.⁸⁰ But the program has encountered difficulties because of the international politics of big versus little, developing versus developed, and North versus South. We believe that the United States should actively support programs of this kind and help them to reach their full potential. We believe the United States should play a leadership role in furthering cooperative international research efforts such as those outlined in ASCEND 21.

U.S. ROLE

Senators Gore and Domenici recently introduced legislation that would establish a program through the DoE national laboratories to assist foreign countries in addressing global energy and environmental issues.⁸¹ Federal programs of this kind are useful in promoting the diffusion of environmental technologies to developing countries, where they can significantly influence energy conservation and environmental protection efforts.

The European Community (EC) has sponsored initiatives to improve the use of environmental technologies. We believe that the United States should collaborate with the EC countries and with academic institutions to develop and share new technologies. Involving U.S. representatives, and particularly representatives of federal agencies, with the EC effort may be a way to initiate collaborations. An effort to establish collaborative arrangements between the national laboratories of various countries would be especially worthwhile.

We endorse the recommendations of the recent Carnegie Commission report *International Environmental Research and Assessment: Proposals for Better Organization and Decision Making*. It proposes that

the United States Government and its scientific and engineering communities should take the lead in further building the international institutional frameworks for environmental research and for advice to governments on which all nations are bound to come to rely.⁸²

This would involve two major initiatives. The first is the establishment of an international consultative group for research on environment to review progress in environmental research in relation to developing countries, to improve research for these countries, and to enhance the effectiveness of research institutions by promoting cooperation between them; and the second is an improvement in the international scientific assessment of environmental issues and the integration of this assessment more effectively with international policymaking. Improved links between assessment and policymaking would involve strengthening cooperation between international scientific and technical organizations. It would also mean developing stronger ties between U.S. Government agencies that give science policy advice and their counterparts in other nations.

In an effort to improve the international links between environmental assessment and policymaking, the International Council of Scientific Unions is promoting the organization of a group of nongovernmental international and national agencies to assess environmental problems. The group would undertake assessments and meet regularly with representatives of government agencies to appraise R&D priorities and to consider approaches to achieve international environmental protection and sustainable development objectives.

THE UNITED STATES AS A RELIABLE PARTNER

The United States must work to improve its reputation as a reliable partner in international environmental efforts and must reestablish its leadership role in setting environmental policy. While other nations, such as Japan, the Netherlands, and Germany, have placed an emphasis on sustainable development, U.S. policies have lagged. U.S. governmental agencies must devote more attention to the sustainable use of resources and must direct substantially greater resources to addressing global environmental challenges through international R&D activities. One reason for establishing a new Department of the Environment is that such a department could provide leadership for U.S. governmental agencies in addressing global environmental problems while acting as a focal point for linking our environmental R&D efforts with those of other nations.

Becoming a more reliable partner in environmental efforts will also require a change in the posture of the United States Government toward international scientific cooperation. A recent study of the U.S. role in cooperating with the industrialized democracies on science and technology found that cooperation was hampered by two major factors: the lack of a coherent policy by the U.S. Government or its specific agencies toward inter-

national scientific cooperation, and the low priority accorded to international cooperation in science by the government.⁸³ Both of these barriers can be overcome by strong leadership.

MULTIDISCIPLINARY COMMUNICATION AND COLLABORATION

■ *Communication and collaboration between the ecological and the environmental health research communities should be enhanced in order to evaluate and address environmental problems in an integrated fashion.*

There is a significant lack of communication between health-oriented and ecology-oriented researchers and policymakers in the United States. Individuals in these fields have earned their degrees in different schools or colleges; they attend different specialty meetings, and they publish in different journals. The two groups communicate using different technical terms and are funded by different agencies. They are interested in different statutes and regulatory regimes, and, unfortunately, they seldom interact.

EFFORTS TO PROMOTE INTERACTION

This lack of interaction is detrimental to our national environmental R&D efforts. In recent years, however, there have been some promising efforts to foster interaction between these communities. In the landmark reports *Unfinished Business*⁸⁴ and *Reducing Risks*,⁸⁵ the EPA Science Advisory Board looked across the full range of risks that fall within EPA's domain. Unfortunately, the risks were ranked according to the conventional health and ecological categories. Nevertheless, we believe that the recommendation of the Advisory Board to raise ecology to the level of attention and visibility of health is an excellent beginning.

The Ecological Society of America has launched an ambitious research plan of its own, the "Sustainable Biosphere Initiative," a framework for the acquisition, dissemination, and utilization of ecological knowledge that supports efforts to ensure the sustainability of the biosphere. The framework calls for coordinated research effort focused on global change, biological diversity, and sustainable ecological systems. The initiative also calls for "a significant increase in interdisciplinary interactions that link ecologists with the broad scientific community, with mass media and educational organizations, and with policymakers and resource managers in all sectors of society."⁸⁶

Within the National Institutes of Health, NIEHS has pursued its mission of basic research in environmental health by funding research on any animal species in which fundamental mechanisms can be studied. Thus, the NIEHS portfolio of studies is fairly broad. In some projects, particularly the Superfund Basic Research Program Projects, NIEHS has brought together highly interdisciplinary groups for both ecological and health investigations. The research tools used by these groups may be applied to both areas. The Executive Committee of the National Toxicology Program consists of the senior administrators of the National Institutes of Health, the National Cancer Institute, the National Institute of Environmental Health Sciences, the National Institute for Occupational Safety and Health, the Agency for Toxic Substances and Disease Registry, the National Center for Toxicological Research, the Food and Drug Administration, and the Environmental Protection Agency. This could serve as a useful forum for evaluating environmental problems related to human health.

The National Research Council's Board on Environmental Studies and Toxicology has an explicit mandate to address environmental and environmental health problems and has made considerable progress in doing so over the past three years. Among many other reports, NRC has issued a series of "biomarkers" studies dealing with exposure, susceptibility, and adverse effects. These reports have focused on biomarkers of reproductive and developmental toxicity, pulmonary toxicity, neurotoxicity, and immunotoxicity, as well as the effects of pollution on trees. The NRC has also been heavily involved in ecological, physical, and socioeconomic assessments of proposed offshore drilling sites. Nevertheless, finding common ground on specific projects remains a challenge.

PROMISING AREAS—RISK AND GLOBAL CLIMATE CHANGE

We believe that there are several promising areas in which greater interaction between the health and ecological communities should be pursued. The risk-assessment/risk-characterization paradigm can be applied to both ecological and health problems or potential problems. Identification of hazard, characterization of risk, and reduction of exposure and risk are common activities, as is the overarching challenge of risk communication. The NRC has established a Committee on Risk Assessment Methodology composed of individuals from the health and ecological research communities who are working together to develop methodologies to assess the risks posed by a broad range of environmental problems.

The global climate change problem has brought environmental modelers and toxicologists together. Stratospheric ozone depletion has been linked primarily to an increased incidence of skin cancer in human beings

as a consequence of higher ultraviolet radiation exposure. However, effects on plankton and other components of the environment may also be significant. When scientific evidence is brought together for risk assessment and risk management purposes, it is essential to understand both the health and the ecological benefits of exposure reduction. Otherwise, only some of the benefits of proposed regulatory actions will be recognized, while the full costs of these actions will receive primary attention.

BUILDING BRIDGES BETWEEN ECOLOGY AND HEALTH

There are opportunities for federal agencies and for Congress to build more bridges between ecological and health research programs. One approach is to foster interdisciplinary programs in federal agencies and in academic institutions. For example, the University of Washington's Institute for Environmental Studies brings together faculty members from the ecological and health communities to work on problems of common interest. We believe that other academic institutions should pursue similar multidisciplinary arrangements.

Second, federal agencies should develop requests for proposals (RFPs) that require interdisciplinary efforts to address environmental problems. Making federal funds available on this basis provides a powerful incentive for investigators and research programs to forge collaborative working relationships. A third approach is for Congress and the Executive Office of the President to encourage interactions between federal agencies and programs that are addressing different aspects of environmental problems. To some extent, the Federal Coordinating Council on Science, Engineering, and Technology within the Office of Science and Technology Policy develops *ad hoc* interactions of this kind, but we believe that additional, more permanent interagency linkages should be sought. For example, EPA's Health Effects Research Laboratory and the National Institute of Environmental Health Sciences, both in Research Triangle Park, North Carolina, should develop collaborative research programs, as noted on pages 81-82. Federal agencies should link their programs and exchange personnel more frequently to foster such collaborations.

LINKS WITH NONGOVERNMENTAL ORGANIZATIONS

■ *The environmental research and policymaking linkages between federal agencies and nongovernmental organizations should be strengthened.*

Nongovernmental environmental organizations (NGOs) occupy a unique niche in the policymaking community.⁸⁷ Because most of them

operate independently of government and industry, they are in a position to undertake critical evaluation of existing policies and to present alternatives. Insulated from the more immediate pressures that drive federal and state agencies, NGOs are able to offer a longer-range perspective and continuity of thinking to policy planning. They can be a significant force in breaking policy gridlock by functioning as "bridging institutions," organizations that can circumvent obstacles, resolve disputes, and catalyze consensus building.⁸⁸

In pursuing their goals, environmental NGOs may or may not operate in an advocacy context. Some organizations do not take public positions on political issues. Others are politically active, entering the fray in an effort to influence policy development in various ways and to increase their membership and enhance their visibility. The activities of most environmental NGOs fall somewhere in between these two poles of political involvement. With respect to scientific questions, the nonadvocacy NGOs have some advantages in that the credibility of their work is not called into question because of political leanings. Such credibility is particularly important for organizations that maintain specialized scientific expertise.

NGOS' CONTRIBUTION TO POLICYMAKING

Over the years, a number of NGOs have made major contributions to national environmental policy. Resources for the Future pioneered much of the early thinking on economics and the environment, proposing the use of economic incentive-based approaches to achieving environmental quality objectives. The Conservation Foundation and the World Wildlife Fund have been particularly successful in dispute resolution and in building a consensus among diverse outside groups with respect to policy initiatives. The "no net loss in wetlands" policy goal resulted from this type of effort. The World Resources Institute has played a key role in the area of global climate change and technology policy, and the Environmental Law Institute is a leader in the analysis of the judicial and regulatory aspects of policy issues. Several other NGOs make important contributions to environmental policymaking in a range of different ways.

NGOs may be organized in response to specific governmental needs. The Health Effects Institute (HEI), established in 1980 and jointly funded by government and industry, works to develop the "credible facts" required to make reasoned policy decisions with respect to the regulation of automobile emissions. The HEI-Asbestos Research was established in 1988 in response to a request to HEI from Congress to try to resolve the controversy about the health risks posed by asbestos in buildings. And Clean Sites, Inc., was established in 1983 to "accelerate the cleanup execution" at Superfund hazardous waste sites.⁸⁹

The independence, specialized skills, and consensus-building abilities of the NGOs are particularly useful in the policymaking process. Because it is difficult to replicate these qualities within federal and state agencies, government agencies should establish and strengthen formal and informal contacts with NGOs. Contracts and grants are two common formal arrangements; representatives of NGOs interact with federal officials by serving on advisory panels or by providing periodic advice on a consulting basis. However, exchange of data and other information is the most common kind of informal interaction.

STRENGTHENING THE LINKAGES

The linkages between NGOs and governmental agencies could be strengthened in several ways. Increased funding for competitive grants and contracts in the policy analysis and development area would give governmental units greater access to NGO expertise. Federal extramural funding for policy analysis is currently very limited; and it should be expanded substantially. Also, governmental organizations should take greater advantage of the capabilities of NGOs if they were more aware of the expertise that exists within key organizations. To this end, NGOs could support the production of a guide for government officials and others informing them of the analytical capabilities and expertise of the major policy-oriented environmental organizations.

Finally, one or more of the environmental NGOs (including professional societies) should work with the American Association for the Advancement of Science (AAAS) to undertake an annual governmentwide analysis and critique of federal environmental research budgets. Such an analysis would be useful to analysts both within and outside the federal government. AAAS has already undertaken an analysis of federal environmental R&D budgets for the National Research Council and the Carnegie Commission.⁹⁰ We encourage the continuation of this effort.

LINKS WITH INDUSTRY

■ *Environmental R&D programs within the federal government and industry should be linked more closely, and the federal government should continue to provide incentives for environmental R&D efforts in industry in order to advance common goals.*

There are many areas in which industrial environmental research and development efforts are aligned with those of the federal government. There are also many areas that are not interconnected, and need not be.

Most of the new technology required for new, low-waste/no-waste technologies can be developed by industry without government support. However, some government assistance is needed to encourage exploratory or general technology development.

DIFFERENT CULTURES, DIFFERENT INCENTIVES

Government and industry laboratories operate in very different cultures and are driven by different incentives. This is especially true of environmental abatement and remediation activities. Industry has many incentives to expedite such work, including community relations, financial expediency, and internal corporate goals. Government, on the other hand, acts in response to mandates from policymakers in the executive and legislative branches.

Each federal laboratory aspires to have, and many claim to have, expertise in several areas of environmental research. However, these research programs are often not well focused, and coordination of laboratory programs is weak. In addition, some government researchers and laboratories are more interested in working on "new technology" and "process development," rather than abatement. Yet, abatement-related R&D is a high-priority need. Government and industry researchers must identify high-priority abatement problems and opportunities to work cooperatively and share information.

To date, too few comprehensive technology assessments have been conducted to support efforts to define goals and establish budget priorities. In addition, even when excellent technology assessments have been undertaken by objective professionals, a consensus on the conclusions and recommendations is hard to forge because the affected parties have different economic, social, and philosophical interests.

Industry and government laboratories alike are heavily focused on the "easy" solutions to environmental R&D efforts, and there is little incentive to expand R&D efforts to tackle more difficult challenges. A plethora of problems is facing the nation, some of which are naturally easier to solve than others. Moreover, researchers typically are working on such a small part of the huge environmental puzzle that they frequently do not recognize findings of significance to other scientific disciplines. They find it difficult to pursue tangential findings or address needs that may become evident during the research and development process.

MERITS AND MECHANISMS OF COOPERATION

A more cooperative spirit appears to be emerging within federal agencies and industries, a spirit that could be translated into joint or cooperative

R&D strategies. To foster communication between government and industry laboratories, we encourage the establishment of informal strategy forums designed to bring together representatives of industry and government. A neutral third party, such as one of the professional societies, the National Research Council, or the Government-University-Industry Research Roundtable, may be helpful in identifying opportunities for information exchange and strategic planning. In some cases, a government laboratory may be able to serve as a forum and technology broker.

Joint government-industry demonstration efforts can be particularly useful in showing how innovative technologies can be applied in the industrial setting. Partnerships of this kind can help bridge related government and industry R&D efforts and promote the transfer and diffusion of technologies within the industrial sector.

The American Institute of Chemical Engineers (AIChE) Center for Waste Reduction Technologies provides an industry focus for policy questions in this area. The center offers an opportunity for groups of companies to work together to advance the development of waste reduction technologies. However, AIChE influences only a narrow cross-section of industry, albeit a critical one. The institute could build alliances with other professional organizations to expand its base. One possibility is to interact with the Society of Manufacturing Engineers, which is awakening to the challenges of environmental protection. Likewise, EPA's Superfund Innovative Technology Evaluation program can serve both as a forum and as a technology broker. An industry-led initiative aimed at cooperation with the SITE program and with EPA's Office of Research and Development could be very productive as well.

We believe that joint government-industry R&D efforts should emphasize consolidation of development efforts without sacrificing the potential for generation of new initiatives that the existence of many sources offers. Such efforts should also identify potential technology bridges to promote the free exchange of information between the principal investigator for an initiative at a federal laboratory and the comparable initiative leader in industry; cooperative policy planning exercises should also be undertaken. Industrial organizations such as the Petroleum Environmental Forum, the AIChE Center for Waste Reduction Technologies, and similar groups in the aircraft and automotive industries should seek new opportunities to interact with government scientists and engineers.

Joint industry-government technology assessments would be worthwhile in certain areas such as economic and technical performance metrics. Efforts such as these help to identify emerging technologies and define new technology needs.

BUILDING A STRONG INTELLECTUAL BASE

Implicit in all of our recommendations up to this point is the assumption that there must be a pool of highly trained professionals to carry out the research and development activities that are critical to our environmental protection programs. Yet this assumption may be little more than wishful thinking in the absence of strong programs and facilities for basic research, education, and training.

- The science and technology base that underpins our environmental R&D programs must be strengthened to ensure the availability of environmental scientists and engineers, social scientists, and policy analysts, and to ensure adequate facilities and equipment to support their work.

NATIONAL SCIENCE FOUNDATION

- *The National Science Foundation and other government agencies should take steps to strengthen the base upon which our national environmental R&D programs are built.*

The scope and direction of grant programs in NSF and other agencies that support environmental R&D activities in universities, nongovernmental organizations, and elsewhere should be examined carefully to determine if additional funding is needed to support certain kinds of research activities. NSF plays an essential role in ensuring that the United States has the scientific disciplinary base necessary to support the nation's future environmental R&D needs. Its experience in awarding federal grants based on merit review procedures makes it an appropriate agency for supporting extramural environmental research activities.

We believe that NSF should substantially expand extramural grants programs devoted to policy research, particularly research designed to integrate the thinking across multiple disciplines (for example, energy, environment, and economics; environmental health and economics; law, regulatory strategies, and risk analysis). NSF should pay particular attention to the adequacy of the nation's environmental science and technology disciplinary base. Certain disciplines, such as environmental biology, will require additional support as the nation and the world strive to achieve sustainable development. The National Research Council's Committee on Environmental Research is evaluating research and development opportunities and needs with respect to protecting the environment. Their conclusions will be useful in identifying other areas that require more federal support.

In addition, NSF, with the assistance of the National Research Council, should undertake a study of the future environmental R&D manpower needs of the nation. In response to the findings and recommendations of this study, NSF should expand existing and establish new competitive educational programs designed to train the physical, biological, and social scientists, engineers, and policy analysts of the future. NSF should work with other federal agencies, especially the Environmental Protection Agency (or a new Department of the Environment), and leading investigators throughout the nation to identify priority research needs and to direct resources toward them.

IMPROVING EDUCATION

■ *Both government and the private sector should take deliberate steps to improve educational programs in the environmental sciences.*

Undergraduate biological, physical, engineering, business, and economics educational programs should include an environmental science component in their curricula. Environmental issues cut across nearly all disciplines; consequently, a broad range of academic courses should have environmental components. Interdisciplinary studies courses are also needed

to give students a broad understanding of environmental problems and to train them in the area of environmental policy.

Graduate and postdoctoral training programs in the environmental and social sciences should be expanded. Additional natural resource economists, environmental health professionals, and risk analysts, among others, will be needed in the future. Several universities have initiated undergraduate programs in environmental studies that combine disciplines such as biology, earth science, engineering, and economics.⁹¹ Programs of this kind should be developed in a larger number of universities throughout the nation to ensure a sufficient pool of trained individuals to meet the future personnel needs of industry and government, as well as the anticipated demand for university-level researchers and professors and secondary-school teachers.

8

CONCLUSION:
KNOWLEDGE AND LEADERSHIP FOR THE FUTURE

The recent United Nations Conference on Environment and Development in Rio de Janeiro focused the attention of world governments and the international public on the new and continuing threats to our global environment. The agreements achieved at that Earth Summit are steps in the right direction, but the meeting also served to highlight just how serious the continuing threats to the biosphere are and how massive and complex the task of overcoming them will be.

KNOWLEDGE AND PROGRESS

Solving the problems highlighted at the conference—the decrease in biodiversity, global climate change, the pressure of growing global population on forests, freshwater supplies, and food, and many more—will require huge

outlays of capital and resources. Some environmentalists believe that a restructuring of the global economy will be necessary to respond to these challenges.⁹¹ But a redistribution of existing resources will be insufficient without major increases in knowledge. This is why the U.S. role in environmental R&D is critically important, and why it is necessary to improve the way the federal government does environmental R&D.

The recommendations made in this report can help the federal government improve its R&D programs; they will also enable the nation to apply the resulting information effectively to the urgent environmental problems the world faces.

SUPPORTING AGENCY MISSIONS

If adopted, our recommendations would strengthen the contributions of environmental R&D to the missions of federal departments and agencies. For example, the consolidation of laboratories and the establishment of new research centers would make EPA more effective; the expansion of training programs at NIEHS would enhance NIH's role in environmental health; better planning and coordination of research, as well as changes in the Park Service and the Bureau of Land Management, would help the Department of the Interior protect our public lands and waterways; the changes we have recommended at the Department of Agriculture would help that agency fulfill its missions, because agricultural productivity and environmental quality go hand in hand. Our recommendations would also help the Department of Defense shift away from its Cold War preoccupation with the Soviet threat to a broader definition of security, and help the Department of Energy with the massive cleanup of hazardous waste at nuclear facilities.

ASSESSMENT, STRATEGIC PLANNING, AND POLICY DEVELOPMENT

We have stressed throughout this report that federal environmental R&D is fragmented and overly focused on short-term problems. To generate the knowledge needed to meet the threats to our planet, the federal system will require better assessment, strategic planning, and policy development capabilities. In particular, the system needs a central coordinating mechanism that can assess problems, develop policy options, set priorities, and shift our R&D system away from short-range, end-of-the-pipe solutions and toward identifying trends, finding root causes, and anticipating problems.

Many federal departments and agencies have environmental R&D programs, and the goals and content of these programs vary widely. It is for this reason that we have recommended bringing all federal environmental R&D programs under one management umbrella, through an Environmental Research and Monitoring Initiative. The Initiative would help the President, through the Office of Environmental Quality, the OSTP, and key agency administrators, set goals and devise strategies to achieve them. We also believe that the enhanced roles we have recommended for the OSTP and the OEQ would strengthen the policy process. In addition, to shift the focus away from the short-term and to strengthen coordination, we have recommended changes in individual departments and agencies and have suggested ways in which these organizations can work together more closely.

Ultimately, of course, focusing and coordinating the federal environmental R&D effort will have an impact only if it leads to new policies. A new Institute for Environmental Assessment would undertake its own analyses and support the work of individuals and institutions outside the federal government through contracts and grants. The Institute would help to ensure that research in the natural and social sciences is brought into the policy arena in the executive branch, much as the Office of Technology Assessment brings together technology and policy for Congress. This new institute, of course, is no guarantee that good policies will be adopted, but we believe that it will be an invaluable resource for bridging the gap that now exists between research and policy.

BETTER MONITORING AND INFORMATION STORAGE

One of the first requirements for creating new knowledge about the environment is a system that can monitor the ongoing natural and human-induced changes in the biosphere. To be useful, information derived from monitoring—especially environmental statistics—must be stored in a form that makes it readily available to those making policy assessments and decisions. Our recommendations will improve the gathering and use of information in several ways.

A new Environmental Monitoring Agency (EMA), combining the National Oceanic and Atmospheric Administration, the U.S. Geological Survey, and some programs within EPA, would bring the key federal environmental monitoring activities together under one roof. The EMA would also work to guide and strengthen the coordination of the environmental monitoring efforts of NASA and other agencies. The National Center for Environmental Information, to be established as part of the EMA, would be a focal point for the storage and retrieval of environmental data.

MAINTAINING A STRONG SCIENCE AND TECHNOLOGY BASE

We recognize that the federal environmental R&D effort will not be able to create new knowledge and apply it to the problems the world faces over time unless it rests on a strong intellectual base. Ultimately, the federal effort will founder without a continuing supply of well-trained natural and social scientists, engineers, health professionals, policy analysts, and others. By strengthening training institutions, helping them communicate with each other and with government and industry, and promoting interdisciplinary training, the recommendations made here can help to provide the environmental experts we need.

CREATING LINKAGES

Our recommendations would also help produce new knowledge by creating new links between environmental researchers. For example, we have recommended linking our national environmental efforts much more closely with international efforts at the United Nations, the European Community, and elsewhere. A closer working relationship would help the United States learn from other nations, help the United States provide assistance to nations whose environmental efforts lag behind ours, and strengthen the bonds of cooperation that are increasingly necessary for the solution of the environmental problems we now confront.

We have also called for the establishment of a new grant program, new forms of collaboration, and new informal forums to link the federal effort more closely with key research efforts outside government—at academic institutions, nongovernmental organizations, and industrial environmental R&D programs.

Moreover, many of our recommendations would strengthen interdisciplinary collaboration on environmental R&D both inside the federal government and outside it, bringing the environmental health, social science, and engineering communities together with the ecological community. This is especially important because a reliance on the traditional disciplines of natural and physical science will not be sufficient to overcome the challenges of the future. To cite but one example, the federal government can no longer afford to consider environmental and economic issues separately. In the words of one expert in this area,

Global warming is a form of feedback from the earth's ecological system to the world's economic system. So are the ozone hole, acid rain in Europe and

eastern North America, soil degradation in the prairies, deforestation and species loss in the Amazon, and many other environmental phenomena.⁹³

We have recommended, therefore, that the federal government foster multidisciplinary programs in federal agencies and academic programs. In particular, we believe that a larger percentage of the total federal environmental R&D budget should be devoted to interdisciplinary policy research.

Finally, many of our recommendations are intended to strengthen the links between federal agencies, whose environmental R&D programs tend to be isolated from each other. For example, many of the changes we have called for in EPA laboratories would help coordinate their activities. We have also called for closer links between NASA's environmental monitoring activities and those of other federal agencies, for closer ties between NIEHS and EPA's health research program, for an integration of DoE laboratories into environmental R&D programs, and for closer connections between DoD and other agencies doing environmental research.

THE IMPORTANCE OF LEADERSHIP

Our recommendations cover a wide range of areas—from the missions of individual government agencies to reform of school curricula—because the need for change is great and the environmental problems we face are urgent. We would stress, however, that the many important problems that the federal environmental R&D effort faces do not stem from a lack of talented people or resources. The recommendations we have made for funding increases and new personnel are modest in comparison to the past R&D expenditures made at the DoE national laboratories, for example. What the federal environmental R&D effort needs most urgently is leadership—leadership to direct the talents of scientists, engineers, and others throughout the nation toward well-defined objectives.

THE PARADOX OF PROGRESS

We live in a time of paradox. Never in history have so many people had access to so much knowledge, such advanced technology, and so many resources. Yet billions of people live in poverty, and in some regions of the world living standards are falling, not rising. Never in history have so many people known so much about the dangers to our environment, or had so

much knowledge that could be used to improve it. Yet population growth and increasing consumption of resources have led to deforestation and watershed destruction throughout the world, have destroyed species, have changed the atmosphere in potentially serious ways, have increased vulnerability to extreme natural events, and have posed difficult problems in managing solid and toxic wastes.

The only way to resolve these dilemmas is through sustainable development that meets the needs of present generations without jeopardizing the well-being of future ones. Such development will be possible only with major advances in knowledge that will allow us to use our resources more efficiently without damaging the environment. The United States must take the lead in pursuing such knowledge, but it can do so only if the federal research effort is reformed.

APPENDIXES

APPENDIX A

FEDERAL ENVIRONMENTAL R&D PROGRAMS

ENVIRONMENTAL PROTECTION AGENCY

The U.S. Environmental Protection Agency (EPA) is the federal government's single largest regulator, its rules imposing annual costs estimated at more than \$80 billion.⁹⁴ EPA is also the *de facto* lead agency for environmental R&D, overseeing several programs that, taken together, comprise the largest internal environmental research effort in the federal government. Like the agency as a whole, EPA's research program has been focused primarily on regulation and regulatory support, and thus relies upon a strong program in applied research.

The Office of Research and Development (ORD) is charged with providing the information base EPA needs to carry out its regulatory mission. The \$502 million appropriated for research at EPA in FY 1992 was part of a slow but steady upward trend in the research budget since the Agency's founding in 1970, the only exception being a reduction in funding between 1982 and 1984 (see Figure A.1).⁹⁵ In constant dollars, however, EPA's R&D budget has declined by about 11 percent between 1980 and 1992.

ORD is organized into eight offices and twelve field laboratories that corre-

Figure A1. EPA Office of Research and Development FY 1980-1992 Funding. (Source: R. Gorman, Subcommittee on the Environment, Committee on Science, Space, and Technology, U.S. House of Representatives.)

spond to EPA's functional areas of research. ORD's four research strategy committees—air, water, pesticides and toxic substances, and solid waste and emergency response (Superfund)—provide overall coordination and set priorities for research. The ORD program focuses on the following environmental media: air and radiation, water quality, drinking water, pesticides and toxic substances, multimedia, hazardous waste, and Superfund. This research program includes special emphasis on global climate change, assessing environmental risks, and pollution prevention.

Within ORD, the Office of Exploratory Research (OER) coordinates a small extramural program in basic, long-term research. OER is in general responsible for informing the national academic research community about the current research challenges facing the EPA, and it backs up this mission with a research grants program and a research centers program. OER's research grants program funds indi-

vidual investigators' research in areas of interest to the agency, including health, biology, chemistry and physics, and engineering. The Environmental Research Centers Program, initiated in 1979, was once a collection of twelve university-based centers, each specializing in a sustained basic science program in a single, specific area such as groundwater, marine science, or hazardous waste.⁶⁶ Today the program supports four centers.

The Office of Environmental Processes and Effects Research examines the entry, movement, and effect of pollutants across the whole range of environmental media, while the Office of Modeling, Monitoring Systems, and Quality Assurance emphasizes research in methods for environmental measurement and monitoring in the characterization, transport, and fate of ecological pollutants. The Office of Health Research's program aims to identify hazards, conduct dose-response assessments, and develop chemical-specific information for regulatory support and technical assistance. The Office of Environmental Engineering and Technology Demonstration has a research program to study, develop, and demonstrate technologies to mitigate environmental impacts, particularly in hazardous waste and waste water. Finally, the Office of Health and Environmental Assessment examines the degree of risk posed by environmental pollutants in order to provide the scientific bases for regulatory decisions and coordinating consistency in risk assessments throughout the agency.

A major challenge facing all of these offices and the entire EPA R&D program is a conflict between research to support the immediate regulatory needs of the agency and the desire to engage in a long-term program of basic environmental research. Traditionally, EPA has devoted only a small proportion of its resources to basic research.

The applied research program is an essential link in the agency's efforts to meet the requirements of an ever-growing body of environmental regulation. Designing EPA's research program to be primarily one of "fighting fires" in meeting near-term programmatic needs is not the optimal way to approach environmental protection. Instead, a more long-term, anticipatory, and prevention-oriented research program focused on basic science—that is, research aimed at a better understanding of the fundamental aspects of an environmental phenomenon as opposed to research aimed toward specific applications—should provide the foundation for assessing risk and setting priorities, for new and innovative mitigation techniques, and for technological developments leading to preventive measures. A recent study by the National Academy of Public Administration documented the nearsighted nature of EPA's research.⁶⁷

EPA's regulatory priorities, and consequently the bulk of its research program, are dependent upon congressionally mandated appropriations, which in turn ultimately stem from public perceptions about environmental risks and the scope of environmental problems. However, the public's perceptions of risk do not coincide with those of the experts. Assessing risk requires a long-term, basic research program—something that is sorely lacking at EPA. The exploratory research grants program, for example, has been neither significant nor consistent over time, hindering many university-based researchers from conducting fundamental research that

supports EPA's mission; the result is that "the base of academic research talent available to EPA is being seriously eroded rather than expanded and replenished."⁹⁸

These kinds of problems are not unknown to the leaders within EPA. In the spring of 1992, EPA Administrator William K. Reilly testified to Congress on a report he had requested from four academic experts regarding EPA's research program.⁹⁹ The report candidly described the weaknesses of EPA's research programs, leading Administrator Reilly to cite his own concerns about the quality and direction of science at EPA and to indicate his desire to make EPA a "premiere science agency." The report called for more science advisors within the agency, a greater reliance on peer review and quality assurance programs, better career opportunities for senior scientists, the recruitment of several research scientists and engineers with world-class reputations, and improved education and outreach programs.

Despite its shortcomings, however, EPA's research program boasts some notable accomplishments. The research program mirrors the agency's regulatory program in its breadth, covering issues from the health effects of air pollution to the ecological consequences of wetlands loss, and it has been successful in supporting the crisis-oriented needs of the regulatory program. Pollution prevention activities are receiving increasing attention within ORD, as are global climate change and risk assessment.

EPA is also expanding its statistical capabilities through programs such as EMAP, the Environmental Monitoring and Assessment Program. Though subject to some early criticism of its design, EMAP is intended to further the development of environmental indicators and monitoring information by assessing the current extent and location and major ecological resources as well as their rate of deterioration.¹⁰⁰ Recent efforts within EPA to improve the quality of science and to renew the research mission, including a proposal to rename ORD the Office of Science and Technology, also seem promising.

NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) supports basic scientific and engineering research, education, and training in the environmental field through competitive grant programs. Two major divisions, covering a wide range of disciplines, funded research totaling more than \$540 million in 1992, making NSF the largest source of extramural grants in the environmental field.

The Directorate for Biological Sciences funds research in biotic systems and resources, molecular biosciences, and cellular biosciences. The thrust of this program is to understand "the genetic and ecological basis for variation in the life histories and physiologies of organisms that allow them to respond to changing environments."¹⁰¹ In addition, the new Directorate for Social, Behavioral, and Economic Sciences funds research that seeks to explore the anthropogenic causes and effects of ecological change. Significant funding is devoted to study of the global change phenomenon, particularly the economic effects of global change on inter-

national trade, the environmental constraints on growth in developing countries, environment-related technological change, and decision making in the public and private sectors in response to short- and long-term environmental risks.

The Directorate for Geosciences supports projects in basic research aimed at understanding and modeling earth systems. Atmospheric sciences, earth sciences, ocean sciences, and arctic and antarctic research are among specific areas of focus. Work in these areas includes understanding the weather and climate variations, groundwater supplies and quality, nuclear waste disposal capabilities, and ocean drilling. The largest portion of the division's resources is devoted to atmospheric and ocean sciences, including \$51.4 million to support the National Center for Atmospheric Research in Boulder, Colorado, and a number of oceanographic centers. NSF provides about 50 percent of federal support for basic geoscience research.

NSF also houses a small extramural grants program in scientific, technological, and international affairs that funds projects in policy research and analysis and some international cooperative scientific activities.

NSF is often commended for the strong merit review system that it employs in distributing research funds. Grants are highly competitive, with only about 15 percent of proposed projects receiving funding each year. Although funds for environment-related research in the social and economic sciences have increased in recent years, these fields have not received nearly as much support as the health and physical sciences.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

The National Oceanic and Atmospheric Administration, a division of the Commerce Department, supports an environmental research program to monitor the status and trends of the oceans and atmosphere. The research program is operated primarily through the Office of Oceanic and Atmospheric Research; supporting offices include the National Environmental Satellite Data and Information Service, the National Marine Fisheries Service, the National Ocean Service, and the National Weather Service. More than \$300 million was allocated in 1992 for environment-related research at NOAA, a substantial increase over the \$226 million appropriated in 1989.¹⁰¹ The National Weather Service is undertaking a major modernization and restructuring program to improve its effectiveness in observing and understanding the atmosphere.¹⁰²

Climate and global change research has become a primary focus at NOAA, much of it aimed at internationally based oceanic and atmospheric trends. The largest portion of the research effort is now centered on the U.S. Global Change Research Program; NOAA is a key agency in establishing an integrated monitoring program for measuring earth systems, for developing conceptual and predictive system models, and for maintaining a global environmental sciences data management system.

Other research programs at NOAA include coastal and ocean research

targeted water quality and coastal ecosystem management; its observations and data form the basis for management decisions associated with the development, use, and protection of these resources. Solar and weather research also are components of the NOAA environmental research program. The Space Environmental Service Center and Laboratory monitor the sun and its influence on earth-based systems, and the applied atmospheric research of the National Weather Service is designed to provide accurate weather forecasting for the nation. A key component of both programs is the National Environmental Satellite, Data and Information Service, which is a system of polar-orbiting and geostationary satellites providing data both globally and regionally on ozone levels, temperature and moisture, cloud cover, and wind speed.

A significant drawback of the NOAA environmental research program, many believe, is the agency's location in the Department of Commerce. Aside from the concern that its location may incline NOAA toward providing "environmental services" to business, its relative isolation limits linkages to other agencies engaged in environmental R&D. In addition, in part because of its position in the Department of Commerce and its remoteness, NOAA has historically been vulnerable to budget cuts, especially during the early to mid-1980s (see Figure A.2). However, the recent federal global warming research initiative has helped reverse this trend.

DEPARTMENT OF ENERGY

The Department of Energy (DoE) operates a program in Biological and Environmental Research that aims to identify, understand, and anticipate the long-term health and environmental consequences of energy use. Research efforts include studies in atmospheric chemistry, a marine program to understand the exchange of energy and materials between the continental shelf and the open ocean, studies of subsurface groundwater and soil transport of energy by-products (including problems of storing and disposing of nuclear waste), studies of adverse health effects of exposure to radiation and chemicals through DoE programs, and efforts to study carbon dioxide and the global change phenomenon. These programs are carried out through the Office of Energy Research and the Fossil Energy Division; also involved are the National Environmental Research Parks and the National Laboratories system, including Argonne, Brookhaven, Berkeley, Lawrence Livermore, Los Alamos, and Oak Ridge. The National Laboratories have been instrumental in the work of the National Acid Precipitation Assessment Program. DoE devoted nearly \$800 million to environmental R&D in 1992, a large portion of this supporting the development of clean coal technologies.¹⁰⁴

DoE plans to devote tremendous resources to the cleanup of waste generated at federal facilities engaged in weapons research. It has been estimated that more than \$150 billion will be required over the next 30 years to clean up all of the DoE facilities. Unfortunately, only a small percentage of current funding is directed to true R&D related to hazardous waste disposal and its effects on the environment. As a result, relatively little is being learned from the cleanup process.

Figure A2. Funding for Environmental R&D at NOAA, 1969–1992

DoE has a critical role to play in the increasingly important linkages between environmental, energy, and economic policies. The National Laboratories are a tremendous resource of expertise and equipment, and the department is examining ways to direct more of their resources to energy and environmental R&D.

DEPARTMENT OF THE INTERIOR

As caretaker of the nation's public lands and waterways, the Department of the Interior maintains a sizeable ecological research program. Most environmental R&D at Interior is located in three of the department's five divisions, the largest programs being in the Fish and Wildlife Service, the U.S. Geological Survey, and the Minerals Management Service.

The U.S. Fish and Wildlife Service's research program provides the data and analysis "to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of people."¹⁰⁵ Through a system of 13 National Research Centers and 41 Cooperative Research Units, the environmental R&D program in-

cludes studies in contaminants, habitat protection and management, population management and restoration, and disease management. This research is particularly important in developing the Endangered and Threatened Species List. It has played a central role, for example, in the controversy over the Northern Spotted Owl and forest policy in the Northwest. Some \$85 million was appropriated for environmental R&D at the Fish and Wildlife Service in 1992.

Within the Land and Minerals Management Division, the Bureau of Land Management, the Minerals Management Service, and the Office of Surface Mining have small environment-related research programs. They include work in forestry, stressed ecosystem management, and global climate change. The Minerals Management Service is responsible for oil and gas development on the outer continental shelf, and it evaluates the effects of these activities through its Environmental Studies Program. Studies of this program undertaken in recent years by the National Research Council provide several recommendations for improving research at MMS.¹⁰⁶

The Water and Sciences Division conducts research through the Bureau of Reclamation, the Bureau of Mines, and the U.S. Geological Survey. The Bureau of Mines houses a research program to develop technology for treating waste from mining operations and to minimize land disturbances resulting from mining operations.

The U.S. Geological Survey's original charter charges it with the "classification of the public lands and examination of the geological structure, mineral resources, and products of the national domain."¹⁰⁷ Its activities include monitoring, gathering data, and conducting analyses of land resources, minerals and energy resources, and geologic hazards. It is also responsible for studies in surface water and groundwater assessment and protection, toxic and nuclear substances hydrology, acid rain, and climate change hydrology. The bulk of its program is carried out in three divisions: the National Mapping Program, Geologic Investigations, and Water Resources Investigations. USGS is also a key player in conducting monitoring activities as part of the U.S. Global Change Research Program.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

The National Aeronautics and Space Administration (NASA) conducts a highly capital-intensive environmental research program through space-based observations of land surface, oceans, and atmosphere. The goal of the program is to gain an understanding of the entire earth system on a global, interrelated scale. In part because of the high cost of the spaceborne hardware necessary for NASA's research program, NASA devoted more than \$800 million to environmental R&D in 1992.

NASA's research program examines each of the component parts of the earth system, to see how they have evolved, how they function, and how they may continue to evolve, in seeking to carry out its mission of understanding the earth from a holistic perspective. These component parts include programs in geodynamics, ocean and land processes, atmospheric dynamics and radiation, and atmospheric

chemistry. The largest portion of the NASA environmental R&D budget today, however, is devoted to meeting the agency's mandates as a primary member of the U.S. Global Change Research program. NASA is the lead agency for extraterrestrial observation and support and provides critical data on atmospheric gases, land surface climatology, and ocean productivity.

Part of its effort to be a leader in environmental R&D, NASA's Earth Observing System (EOS) is an internationally coordinated, multidisciplinary spaceborne observation system that serves as the centerpiece of the agency's "Mission to Planet Earth" initiative. Mission to Planet Earth seeks to chart the processes, movements, and relationships among the earth's components as an integrated system, and it will address major environmental issues such as global warming, stratospheric ozone depletion, tropical deforestation, and desertification. EOS employs several remote sensing satellites and a data and information system in its research program. A recent report by the General Accounting office on the EOS Data and Information system is critical of early system design for lacking key advanced information management technologies that will be required for EOS data to be accessible and useful for some time in the future. The report also stresses that NASA should cooperate more closely with other federal agencies with similar data management experience and similar missions such as NOAA and NSF.¹⁰⁸

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Considerable research in the environmental health field is carried out through various branches of the Department of Health and Human Services (HHS). The focal point for this effort is the National Institute of Environmental Health Sciences (NIEHS) within the National Institutes of Health. NIEHS's research spans a broad range of disciplines and environmental media, and its research funding has followed a steady upward trend throughout the 1980s. The 1992 appropriation was \$303 million, a large portion of which went toward sponsorship of its extramural research grants program.

NIEHS's primary mission is to "conduct and support basic biomedical research studies to identify chemical, physical, and biological environmental agents that threaten human health."¹⁰⁹ NIEHS has a strong program in toxicology testing, test method development, and validation. Other areas of research include radon and indoor air pollution, asbestos and lead exposure, acid aerosols, methyl mercury in fish populations, and the long-range health implications of oil spills. With global change and ozone depletion high on the national agenda, NIEHS has also developed a program to research the impacts on human health of alternative, nonfossil fuels and the consequences of ozone depletion and of chlorofluorocarbons and their potential replacements.

Several university-based Environmental Health Science Centers are supported by NIEHS and work closely with the staff of the Institute and of EPA on current problems (see Table A.1). NIEHS publishes *Environmental Health Perspec-*

Table A1. National Institute of Environmental Health Sciences Research Centers

Center	Location	Estimated FY1992 Budget (\$000)
Occupational and Environmental Health	Harvard University, Boston, MA	1,426
Center for Study of the Human Environment	University of Cincinnati, Cincinnati, OH	1,070
Center for Environmental Management	Oregon State University, Corvallis, OR	1,274
Research in the Environmental Health Sciences	New York University Medical Center, New York, NY	2,254
Center for Environmental Toxicology	Vanderbilt University, Nashville, TN	1,329
Environmental Agents: Relation to Human Health Effects	Mt. Sinai School of Medicine, New York, NY	1,467
Trace Contaminants as Environmental Health Hazards to Man	University of Rochester, Rochester, NY	1,404
Environmental Health Sciences Center	University of California, Berkeley, CA	1,058
Environmental Health Sciences Center	MIT, Cambridge, MA	1,117
Environmental Health Sciences Center	John Hopkins University, Baltimore, MD	1,378
Environmental Health Sciences Center	University Medical and Dental School, Piscataway, NJ	1,101
Environmental Health Sciences Center	University of Iowa, Iowa City, IA	651
Duke University Marine Biomedical Center	Duke University, Durham, NC	316
NIEHS Freshwater Biomedical Center Grant	University of Wisconsin, Milwaukee, WI	257
Marine Freshwater Biomedical Center Grant	University of Connecticut, Storrs, CT	300
A Marine and Freshwater Biomedical Science Specialized Center of Research at the Mount Desert Biological Lab	Mt. Desert Island Biological Lab, Mt. Desert, ME	277
NIEHS Marine Freshwater Biomedical Sciences	Oregon State University, Corvallis, OR	255
TOTAL		16,934

tives, a widely distributed peer-reviewed journal that deals with both longstanding and newly discovered problems. Finally, NIEHS supports pre- and postdoctoral training in environmental health sciences.

The National Center for Toxicology Research (NCTR) in the Food and Drug Administration, the Agency for Toxic Substances and Disease Registry (ATSDR), the Center for Environmental Health and Injury Control (CEHIC) and the National Institute for Occupational Safety and Health (NIOSH), both within the Centers for Disease Control, all have research programs in environmental health. Located in Jefferson, Arkansas, the National Center for Toxicology Research (NCTR) serves as the basic research arm for the Food and Drug Administration. Its primary mission is to study the biological effects of potentially toxic chemical substances found in the environment, emphasizing the determination of the health effects resulting from the long-term, low-level exposure to toxicants and the basic biological processes for chemical toxicants in animal organisms. One of the major goals of NCTR is to test the assumptions of underlying toxicological risk assessments. Another participant in the effort to assess the impact of toxic chemicals on human health is CEHIC. ATSDR is mandated by the Superfund laws to examine the health effects of exposure to hazardous substances. It also publishes toxicological profiles, health assessments, exposure assessments, and community registries.

The National Toxicology Program, established in 1978 and administered by the director of NIEHS, aims to coordinate the various toxicological programs within HHS and serves as the principal toxicological testing program. The program is designed to evaluate the effects of potentially toxic compounds and to develop and validate new and better toxicological test methods. It also disseminates the results to the academic, commercial, and regulatory communities and to the public.

Another aspect of health research is those activities that have an impact on the day-to-day occupational environment of workers in the U.S. The mission of the National Institute of Occupational Safety and Health is to manage "a national program of occupational safety and health research . . . to estimate and disseminate scientific and public health information to ensure safe and healthful working conditions. . . ." ¹⁰ The work at NIOSH supports the Occupational Safety and Health Administration. Engineers, epidemiologists, physicians, and toxicologists seek to identify work-related injuries and illness, assess the toxicity of hazardous material found in the workplace, and evaluate the causes of the ten leading work-related diseases and injuries. The ultimate goal of the NIOSH research program is to provide the basis for preventing occupational illness and injury. In 1992, \$93 million was spent on research at NIOSH.

DEPARTMENT OF AGRICULTURE

The U.S. Department of Agriculture (USDA) houses environment-related research in two divisions: the U.S. Forest Service and the Agricultural Research Service. The U.S. Forest Service (USFS), as part of its mission to oversee the management and

use of the nation's 1.6 billion acres of forest land, provides scientific and technical information through its Forest Research program. The Forest Service appropriation was \$115 million in 1992. A network of 9 experiment stations and 183 research units conduct research in timber management, forest products and harvesting, forest protection, resource analysis research, and forest environmental research. The Forest Service research program focuses on "national problem" areas, including tropical forestry, recycling, and the ecological and social values of forest land.

The Agricultural Research Service (ARS) provides the scientific basis for the production of agricultural commodities that demonstrate wise management and use of the environment; its work has undergirded the major advances in the volume of food and fiber for national and international consumption. Studies of soil erosion, pesticides and fertilizer, and irrigation constitute the bulk of the research program. ARS is also a participant in the global change research program, investigating potential effects of climate change on the nation's agriculture. ARS's funding of \$162 million in 1992 supported the eight area offices that coordinate 126 field experiment stations around the country.

The Cooperative State Research Service (CSRS) administers the Department of Agriculture's grant programs for agricultural research. More than half of CSRS's grants are distributed by formula to agricultural research programs at agricultural experiment stations, approved schools of forestry under the Cooperative Forestry program, 1890 land grant colleges, and Tuskegee University. Matching funds are required from all but the land grant colleges and Tuskegee University. Funding for formula grants has remained stable in recent years. CSRS nonformula grants for environmental R&D, including competitive grants and Special Research Grants through itemized appropriations, increased considerably between 1990 and 1992. Total CSRS funding for FY 1992 was an estimated \$119 million.¹¹¹

In addition to its funding for the Agricultural Research Service (\$162 million), the Cooperative Research Service (\$119 million), and the Forest Service (\$115 million), the Department's Economic Research Service spent an estimated \$7 million in FY 1992 on economic research related to natural resource management.¹¹² All told, the Department of Agriculture devoted an estimated \$403 million to environment-related R&D in FY 1992.

Following the recommendations of a report published in 1989 by the National Research Council regarding the need to strengthen the agricultural research system, USDA has proposed a National Research Initiative.¹¹³ This initiative calls for \$500 million in new research grants over a period of ten years to focus on basic rather than applied research and on agricultural productivity rather than production; the grants would be made in the areas of natural resources and the environment, nutrition, food quality and health, animal systems, and plant systems.

The NRC has also looked more specifically at the need to study and integrate alternative agricultural practices.¹¹⁴ Citing EPA's finding that agriculture is the largest nonpoint source of surface water pollution, the NRC sought to examine "alternative" agricultural processes—that is, those practices that have the goals of reducing input costs, preserving the resource base, and protecting human health. Alternative agriculture includes practices such as crop rotation, integrated pest man-

agement, soil- and water-conserving tillage, and genetic improvement of crops. The NRC found, among other things, that only a small number of U.S. farmers currently use alternative farming systems, in large part because federal policies work against environmentally benign practices.

Plant biology research is the subject of another National Research Council report that was requested by NSF, USDA, and DoE. The study examines the mechanisms of research funding, the balance of plant biology research between basic and applied research, and the commitment to building and maintaining a strong infrastructure and personnel base.¹⁵ The report recommends establishing a National Institute of Plant Biology within USDA, promoting better cooperation among agencies engaged in plant biology research, and forming an independent advisory group of nongovernment scientists to help give direction and focus to USDA's research program.

Like EPA, USDA has been criticized for concentrating its efforts on short-term, applied research to the detriment of a basic research program. The National Research Initiative and the efforts to study alternative agriculture and plant biology aim to overcome this criticism and fill voids in the current USDA research program.

DEPARTMENT OF DEFENSE

The Department of Defense (DoD) houses a considerable environmental research program involving all three branches of the military. This program is divided into two major categories: the natural environment and environmental quality. Researchers evaluate the natural environment in order to gather information necessary for defense operations. Research related to environmental quality addresses the countless training, testing, storage, and disposal sites used by the military in its routine activities. R&D efforts are required to maintain and improve the environmental quality of those sites.¹⁶ The Deputy Assistant Secretary of Defense (Environment) provides guidance and broad research coordination between the services, although individual projects are fairly autonomous. Environmental R&D spending at DoD totaled nearly \$600 million in 1992.

The largest environmental research program at DoD is within the Office of Naval Research (ONR) in the Department of the Navy. ONR's mission is basic research, which it supports through grants to universities and industry at a funding level of approximately \$500 million per year. Oceanography is the primary focus of the ONR research program, including ocean pollution from ships, marine meteorology, and research on tides. ONR also conducts arctic research with an emphasis on ice flows and ocean conditions beneath arctic ice.

Senator Sam Nunn and others have led an effort to redirect a significant amount of DoD resources toward a Strategic Environmental Research and Development Program (SERDP). This initiative proposes that the capabilities of the defense establishment be used now for existing environmental cleanup activities and in the longer term for understanding environmental problems such as global cli-

mate change, deforestation, and population growth. The new focus on environmental R&D within the Defense Department would be accomplished by utilizing information gathered by intelligence sources, by sharing previously inaccessible data gathered from military aircraft, ships, and submarines with environmental researchers, and by providing access to DoD supercomputers for modeling and data analysis.

The U.S. Army Corps of Engineers is an important contributor to environment-related research at DoD. The Corps is specifically responsible for two of the twenty-eight technical areas slated for research under SERDP, civil engineering and environmental quality. The Corps also houses an active wetlands study program.

SMITHSONIAN INSTITUTION

The Smithsonian Institution is home to a wide range of research and educational organizations, including fourteen museums and research stations worldwide. Although overall funding for environmental research is modest in comparison to some other agencies—\$33 million in 1992—the diverse components of the Smithsonian study a great many environmental topics. Seven research bureaus conduct most of the environmental research programs: the National Air and Space Museum, the National Museum of American History, the National Museum of Natural History, the National Zoological Park, the Smithsonian Astrophysical Observatory, the Smithsonian Environmental Research Center, and the Smithsonian Tropical Research Institute.¹⁷ For example, the Smithsonian Environmental Research Center, on the Chesapeake Bay in Maryland, focuses on landscape ecology—the environmental interaction between ecosystems and habitats, with a special emphasis on wetlands—and the Smithsonian Tropical Research Institute, headquartered in Panama, studies the ecology, behavior, and evolution of tropical organisms and the impact of past and present human activity on tropical ecosystems. The National Museum of Natural History has the largest budget for environmental R&D, about \$22 million in 1992. Its research includes extensive programs on biodiversity, systematics, paleoecology, and the interactions between humans and nature.

OTHER AGENCIES

A number of other federal agencies operate small programs that are related to environmental R&D, including the Agency for International Development, the Tennessee Valley Authority, and the Department of Transportation.

The Agency for International Development (AID) supports environment-related research in agricultural and natural resource development. A large portion of this program is devoted to research on the social and economic aspects of environmental issues. AID's environmental R&D program is largely applied and largely extramural, totaling \$45 million in 1992.

The Tennessee Valley Authority (TVA) conducts environment-related R&D primarily at its National Fertilizer and Environmental Research Center, founded in 1991. This center focuses on R&D related to water quality and soil nutrients. TVA also conducts research on regional and power development issues. Total environmental R&D spending at TVA in 1992 was \$31 million.

Environmental R&D at the Department of Transportation (DoT) is performed by the Coast Guard, the Federal Highway Administration, and the Federal Aviation Administration. The Coast Guard's R&D program is focused on oil spills and pollution, while the Federal Highway Administration's R&D addresses air pollution from highway vehicles and the environmental impacts of other aspects of highway operations, such as noise and runoff. The Federal Aviation Administration's environmental R&D efforts seek to reduce noise and fuel emissions from aircraft. Total environmental R&D funding at DoT was about \$17 million in 1992.

APPENDIX B
BIOGRAPHIES OF TASK FORCE MEMBERS

Douglas M. Costle is a former administrator of the U.S. Environmental Protection Agency and former dean of Vermont Law School. Mr. Costle has also been a trial attorney in the Civil Rights Division of the U.S. Department of Justice and has served as an attorney for the U.S. Department of Commerce, Economic Development Administration. He worked as an associate with two San Francisco law firms before becoming senior staff associate to the President's Advisory Council on Executive Organization, in Washington, DC, where he played a key role in establishing the U.S. Environmental Protection Agency. Mr. Costle has served as commissioner of the Connecticut Department of Environmental Protection, as assistant director of the U.S. Congressional Budget Office, and as a fellow of the Smithsonian Institution's Woodrow Wilson International Center for Scholars. He was EPA Administrator from 1977 to 1981. Mr. Costle has also been a visiting scholar at the Harvard School of Public Health and an adjunct lecturer in the John F. Kennedy School of Government. He is a graduate of Harvard University and the University of Chicago Law School.

Robert W. Fri is president of Resources for the Future, an independent nonprofit organization that conducts research and policy analysis on issues affecting natural resources and environmental quality. He received a BA with Honors in Physics from Rice University and an MBA from Harvard. From 1971 to 1975 he served as first deputy administrator and then as acting administrator of the Environmental Protection Agency. From 1975 to 1977 he served as first deputy administrator and then as acting administrator of the Energy Research and Development Administration. Before joining Resources for the Future he was a member of the management consulting firm McKinsey and Company and was president of the Energy Transition Corporation, which engaged in new energy product development. He is a trustee of the Environment and Energy Study Institute, Science Service, Inc., and the Atlantic Council of the U.S. and a member of the Advisory Council of the Electric Power Research Institute, Phi Beta Kappa, and Sigma Xi.

Edward A. Frieman is director of the Scripps Institution of Oceanography, and Vice Chancellor, Marine Sciences of the University of California, San Diego. Before joining Scripps, he was executive vice president of Science Applications International. He formerly was director of Energy Research for the U.S. Department of Energy. He was a professor of astrophysical sciences and deputy director of the Plasma Physics Laboratory at Princeton University from 1952 to 1979. He is a member of the National Academy of Sciences, the American Association for the Advancement of Science, the American Physical Society, the American Philosophical Society, and Sigma Xi.

Stephen J. Gage is president of the Cleveland Advanced Manufacturing Program in Cleveland, Ohio. From 1977 to 1980 he was assistant administrator for research and development of the U.S. Environmental Protection Agency. He received his BS in Mechanical Engineering from the University of Nebraska, and an MS and PhD in Nuclear Engineering from Purdue University. From 1965 to 1971 he was director of the Nuclear Reactor Laboratory at the University of Texas at Austin. His private-sector experience includes positions with Baxter Travenol, where he worked on computer-aided design and manufacturing, and International Harvester, where he was in charge of advanced engineering research. Prior to his current position, Dr. Gage was president of the Indiana Corporation for Science and Technology, which promotes economic development and growth in the areas of science and technology for the State of Indiana. He was a staff member of the Council on Environmental Quality and Director of the Interagency Energy-Environment R&D Program at the U.S. Environmental Protection Agency, where he later served as deputy assistant administrator for Energy, Minerals, and Industry R&D.

Bruce W. Karth is vice president for safety, health, and environmental affairs at the Du Pont Company. He has been with Du Pont since 1970. He received his MD from the Medical College of Alabama at Birmingham. He is vice chairman of the company's Environmental Leadership Committee and chairman of the Environ-

mental Resources Committee. He is a fellow of the American College of Occupational Medicine and the American College of Preventive Medicine. Dr. Karrh is a member of the board of directors of the American Industrial Health Council, the Institute for Cooperative Environmental management, the Global Tomorrow Coalition, and the Chemical Industry Institute of Toxicology.

Gordon J. F. MacDonald is a professor at the University of California, San Diego Graduate School of International Relations and Pacific Studies, and the director for environmental policy studies at the University of California's Institute on Global Conflict and Cooperation. He received his AB, AM, and PhD from Harvard University. Dr. MacDonald served Presidents Eisenhower and Kennedy as staff associate for the new National Aeronautics and Space Administration and was appointed in 1965 to the President's Science Advisory Committee, where his principle work focused on oceanography, naval warfare, and strategic policies. He was appointed to the first Council on Environmental Quality by President Nixon. He has also served on the Department of State's Advisory Committee on Science and Foreign Affairs and the Defense Science Board, among other bodies. He is a member of the Department of State's Advisory Committee on Oceans and International Environmental and Scientific Affairs.

Gilbert S. Omenn is professor of medicine (medical genetics) and of environmental health and dean of the School of Public Health and Community Medicine at the University of Washington, Seattle. He is principal investigator of the Carotene and Retinol Efficacy Trial (CARET) to prevent lung cancer and director of the Center for Health Promotion in Older Adults. Dr. Omenn served as deputy to Frank Press, President Carter's Science and Technology Advisor and director of the White House Office of Science and Technology Policy, and then as an associate director of the Office of Management and Budget. He was a visiting senior fellow at the Woodrow Wilson School of Public and International Affairs, Princeton University; later, he was the first Science and Public Policy Fellow at The Brookings Institution, Washington, DC. He was elected to membership in the Institute of Medicine and served on its Council. He has chaired the Board of Environmental Studies and Toxicology of the National Research Council, and the Electric Power Research Institute's EMF Health Effects Technical Advisory Board. He serves on the board of directors of Rohm & Haas Company, Amgen, Immune Response Corporation, and the RAND Critical Technologies Institute. He was a White House Fellow at the Atomic Energy Commission. He received his AB from Princeton, his MD from Harvard, and his PhD in Genetics from the University of Washington.

David P. Rall served as director of the National Institute of Environmental Health Sciences from 1971 to 1991. He received his MD and PhD from Northwestern University in 1951. He interned on the Second (Cornell) Medical Division in 1952-1953, and then joined the National Cancer Institute (NCI) as an officer in the United States Public Health Service (Assistant Surgeon General). His early research dealt with anticancer drugs, including treatment of meningeal leukemia in children. The

success of this treatment was critical to the cure of some forms of acute leukemia in children. At NCI he was responsible for the preclinical toxicology of the anticancer drugs being developed, and he became interested in predictive toxicology and population toxicology. Dr. Rall became director of the National Institute of Environmental Health Sciences in 1971. He also served as the director of the National Toxicology Program.

H. Guyford Stever, a member of the Carnegie Commission on Science, Technology, and Government, was director of the National Science Foundation from 1972 to 1976; during this time he also served as Science Advisor to Presidents Nixon and Ford. Dr. Stever was director of the White House Office of Science and Technology Policy from 1976 to 1977. Before joining NSF, he was a professor at MIT from 1945 to 1965 and president of Carnegie Mellon University from 1965 to 1972. Dr. Stever was Chief Scientist of the U.S. Air Force in 1955-1956. During World War II, in 1941 and 1942, he taught and did research in radar at the MIT Radiation Laboratory, and from 1943 to 1945 was scientific liaison officer on radar and guided missiles in the London Mission of the Office of Scientific Research and Development, including seven technical intelligence missions to the continent of Europe. In the past decade he is or has been a director of TRW Inc., Schering-Plough Corporation, and Goodyear Tire and Rubber Company; a trustee of Woods Hole Oceanographic Institute, and of Science Service, president and trustee of Universities Research Association, and foreign secretary of the National Academy of Engineering. He received his PhD in Physics from the California Institute of Technology. In 1991 he received the National Medal of Science, the nation's highest honor to a scientist, awarded by the President.

Gilbert F. White is a professor emeritus at the Institute of Behavioral Sciences, University of Colorado, Boulder. He received his SB, SM, and PhD from the University of Chicago. He was a geographer with the Mississippi Valley Committee, the Natural Resources Committee, and the National Resources Planning Board. He worked in the Bureau of Budget, Executive Office of the President, from 1940 to 1942 and was President of Haverford College from 1946 to 1955. Dr. White has also been a professor of Geography, University of Chicago; vice chair, President's Water Resources Policy Commission, 1950; and a member of the UNESCO Advisory Committee on Arid Zone Research (1953-1956) and the UNESCO Advisory Committee on Natural Resources Research (1967-1971). He is currently a member of the Advisory Group on Greenhouse Gases, the World Meteorological Organization, the United Nations Environment Program (UNEP), and the Advisory Committee on Environment of the International Council of Scientific Unions. He received the Tyler Prize for Environmental Achievement in 1992.

Mark Schaefer is senior staff associate and director of the Washington office of the Carnegie Commission on Science, Technology, and Government. He received his PhD in the neurosciences from Stanford University in 1987. After completing his undergraduate degree at the University of Washington in 1977, he worked for five

years in the Office of Research and Development of the U.S. Environmental Protection Agency. Dr. Schaefer was on the staff of the Congressional Office of Technology Assessment from 1987 to 1989, first as a Congressional Science Fellow and later as project director of OTA's study of the effects of toxic chemicals on the nervous system. From late 1989 to early 1990 he was a Guest Scholar at the Brookings Institution. Since 1988, he has taught an environmental policy tutorial for Stanford University's Washington program.

NOTES AND REFERENCES

1. Carnegie Commission on Science, Technology, and Government, *E1: Organizing for Environment, Energy, and the Economy in the Executive Branch of the U.S. Government*, September 1991, p. 2.
2. Carnegie Commission on Science, Technology, and Government, *Enabling the Future: Linking Science and Technology to Societal Goals*, September 1992.
3. The National Commission on the Environment, chaired by Russell Train, is sponsored by the World Wildlife Fund headquartered in Washington, DC. Its report, *Choosing a Sustainable Future* (Island Press, Washington, DC, in press), is expected to be published in January 1993.
4. If a U.S. Environmental Monitoring Agency is established, as recommended later in this report, some of the activities of a proposed National Environmental Monitoring Systems Laboratory (NEMSL) should be integrated with those of, or transferred to, the new agency.
5. This Task Force did not examine the issue of the organization of a Department of the Environment. For an in-depth discussion of the potential structure of such a department, we refer the reader to the report by the National Commission on the Environment, cited in note 3, above.
6. National Library of Medicine, Planning Panel on Toxicology and Environmental Health, *Report to the Board of Regents of the National Library of Medicine*, Bethesda, Maryland, September 1992.
7. Cheryl Simon Silver with Ruth S. DeFries, *One Earth, One Future: Our Changing Global Environment*, National Academy Press, Washington, DC, 1990, p. 15.

8. *The State of the Environment*, Organization for Economic Cooperation and Development, Paris, 1991, pp. 283-284.
9. Paul C. Stern, Oran R. Young, and Daniel Druckman, editors, *Global Environment Change: Understanding the Human Dimension*, National Academy Press, Washington, DC, 1992, p. 17.
10. *Ibid.*
11. L. Anzipe, R. Constanza, and W. Lutz, "Primary Factors Affecting Population and Natural Resource Use," Report from the International Conference on an Agenda of Science for Environment and Development, Vienna, Austria, November 24-29, 1991, p. 2.
12. *Ibid.*
13. In Cheryl Simon Silver with Ruth S. DeFries, *op. cit.*, note 7 above.
14. George Brown, "Global Change and the New Definition of Progress," a speech before the Annual Meeting of the Geological Society of America, October 21, 1991, pp. 5-6.
15. Michael Kowalok, "The Origin and Progress of Scientific Findings on Critical Environmental Issues," background paper prepared for the Carnegie Commission on Science, Technology, and Government, 1992.
16. Mark Schaefer, "The Federal Research Puzzle: Making the Pieces Fit," *Environment* 33(9): 16-20; 38-42, 1991. Steven J. Kafka, "Federal Environment Research and Development Programs: Organizational Policy Issues for the 1990s and Beyond," background paper prepared for the Carnegie Commission on Science, Technology, and Government, 1991.
17. For a detailed discussion, see Steven J. Kafka, *op. cit.*, note 16 above.
18. D. Allan Bromley, "A Science and Technology Policy for the 1990's," address to the AAAS Colloquium on Science and Technology Policy, Washington, DC, April 16, 1992.
19. When the Environmental Protection Agency was established in 1970, its original mandate was to take a long-term view of the overall condition of the environment and its capacity to support a health life for all species—including human beings. However, in the years that followed, Congress gave EPA a plethora of very specific regulatory responsibilities. These added duties have weakened EPA's ability to do comprehensive long-range planning and to look at the "big picture." See, for example, Chapter 2 of *Future Risk: Research Strategies for the 1990s*, U.S. EPA, Science Advisory Board, September 1988, SAB-EC-88-040.
20. *Environmental Research and Assessment: Proposals for Better Organization and Decision Making*, Carnegie Commission on Science, Technology, and Government, July 1992.
21. Carnegie Commission on Science, Technology, and Government, *op. cit.*, note 1 above, p. 14.
22. Office of Management and Budget, *Budget of the U.S. Government FY 1993*, U.S. Government Printing Office, Washington, DC, p. 131.
23. World Resources Institute, *Backs to the Future: U.S. Government Policy toward Environmentally Critical Technology*, Washington, DC, June 1992, p. 19.
24. Harvey Brooks, "Innovation and Competitiveness," a symposium lecture in memory of J. Herbert Hollomon, April 9, 1991.
25. Carnegie Commission on Science, Technology, and Government, *Technology and Economic Performance: Organizing the Executive Branch for a Stronger National Technology Base*, New York, September 1991.
26. Congressional Research Service, *Federal R&D in Environmental Technologies*, July 17, 1992, p. 6.
27. Jonathon Parker, "Environmental Assessment: Two Conferences on Environmental Indicators and Indices," *Environment* 33(5):41-43, 1991.
28. Office of Management and Budget, *Budget of the United States Government, Fiscal Year 1993*, U.S. Government Printing Office, Washington, DC, 1992, p. 397.
29. For example, despite a growth in EPA program responsibilities during the 1980s, the EPA operating budget fell from \$1.7 billion in 1979 to \$1.0 billion in 1983, and only increased to \$1.7 billion again in 1991 (in constant 1982 dollars). See GAO/RCED-91-97.
30. Edward S. Rubin, Lester B. Lave, and M. Granger Morgan, "Keeping Climate Research Relevant," *Issues in Science and Technology* 8(2):47-55, 1992.
31. Jonathon Parker, *op. cit.*, note 27 above, p. 42.
32. U.S. Environmental Protection Agency, *Unfinished Business*, Washington, DC, 1987, p. 97.

33. Charles W. Powers, "The Role of NGOs in Improving the Employment of Science and Technology in Environmental Management," background paper for the Carnegie Commission on Science, Technology, and Government, Task Force on Nongovernmental Organizations, 1991.
34. Committee for the NIE, "National Institutes for the Environment: A Proposal," Washington, DC, 1992.
35. The Environmental Quality Improvement Act of 1970 (Public Law 91-224) established the Office of Environmental Quality: "There is established in the Executive Office of the President an office to be known as the Office of Environmental Quality . . . The Chairman of the Council on Environmental Quality established by Public Law 91-190 shall be the Director of the Office. There shall be in the Office a Deputy Director who shall be appointed by the President, by and with the advice and consent of the Senate."
36. Carnegie Commission on Science, Technology, and Government, *op. cit.*, note 1 above.
37. Mark Schaefer, "Bridging the Environmental Research/Policy Interface: Three Organizational and Procedural Proposals," presented at the Annual Meeting of the American Association for the Advancement of Science, February 10, 1992.
38. Robert W. Fri, "Used and Useful: Science, Technology, and Policy," remarks presented at the Electric Power Research Institute Board of Directors/Advisory Council Summer Seminar, August 10, 1992.
39. Schaefer, *op. cit.*, note 37 above.
40. National Commission on the Environment, *op. cit.*, note 3 above.
41. Carnegie Commission on Science, Technology, and Government, *op. cit.*, note 2 above.
42. Office of Science and Technology Policy, "Our Changing Planet: The FY 1991 U.S. Global Change Research Program," a report by the Committee on Earth Sciences, Federal Coordinating Council for Science, Engineering, and Technology.
43. William D. Ruckelshaus, "Risk, Science, and Democracy," *Issues in Science and Technology* 1(3):19-38, 1985.
44. U.S. Environmental Protection Agency, "Safeguarding the Future: Credible Science, Credible Decisions," EPA/600/9-91/050, March 1992.
45. Letter to the Honorable Edward P. Boland, Chairman, House Appropriations Subcommittee on VA, HUD, and Independent Agencies, April 5, 1984.
46. Ralph de Gennaro, Friends of the Earth, testimony before the House Committee on Science, Space, and Technology, March 19, 1992.
47. U.S. House of Representatives, Committee on Science, Space, and Technology, "The Role of Science at EPA and Fiscal Year 1993 Budget Authorization for EPA's Office of Research and Development," Hearing, March 19, 1992, No. 129, U.S. Government Printing Office, Washington, DC.
48. After the Task Force drafted its proposal for combining the USGS and NOAA, it was brought to a Task Force member's attention that a similar proposal had been developed by a USGS employee in 1987. The USGS Chief Geologist, Robert M. Hamilton, wrote an internal memorandum (dated January 16, 1987) in which he stated: "Program coordination and integration with NOAA are potentially so important that they deserve special consideration. In reality, the USGS has more programmatic interests in common with NOAA than with other DOI bureaus. I believe that integration of USGS and NOAA information and data services should be seriously evaluated. Moreover, I think consideration should be given to combining USGS and NOAA to form a new organization." Dr. Hamilton went on to suggest the new organization be called the National Earth Science and Technology Administration (NESTA).
- Indeed, Dr. Hamilton sought and received confirmation from Walter J. Hickel, Sr., former Secretary of the Interior (in a letter dated June 18, 1986), that during the Nixon Administration serious consideration had been given to placing NOAA in the Department of the Interior.
49. I-1: an independent evaluation of the EMAP Program, see "Review of EPA's Environmental Monitoring and Assessment Program (EMAP): Interim Report," National Research Council, Washington, DC, June 1992.
50. Information on *Arctic Data Interactive: A Prototype CD-ROM Science Journal* may be obtained from the Information Systems Division, U.S. Geological Survey, 801 National Center, Reston, VA, 22092.

51. U.S. Geological Survey Yearbook, Fiscal Year 1991, p. 24.
52. Committee on Merchant Marine and Fisheries, Subcommittee on Oceanography and Great Lakes, H.R. Rept. 101-92 (Status of NOAA in the Department of Commerce) 101st Cong., 2nd Sess. at 31-33 (May 8, 1990).
53. Department of Commerce, "NOAA Ship to Survey Persian Gulf Oil Spills," Press Release NIL 92-2 (January 8, 1992).
54. Department of Commerce, "More Damaging Gases Reaching Ozone Than Originally Thought," Press Release NIL 91-72 (July 30, 1991).
55. Robert G. Fleagle, "The Case for a New NOAA Charter," *Bulletin of the American Meteorological Society* 68:1417, 1422, 1987. In fact, in 1983 the Office of Management and Budget required that NOAA no longer identify its research as "basic."
56. Testimony of Martin H. Belsky in Committee on Merchant Marine and Fisheries, Subcommittee on Oceanography and Great Lakes, H.R. Rept. 101-92 (Status of NOAA in the Department of Commerce) 101st Cong., 2nd Sess. at 20-23 (May 8, 1990).
57. Robert G. Fleagle, "The U.S. Government Response to Global Change: Analysis and Appraisal," *Global Change* 20:57-81, 1992.
58. According to the 1992 Appropriations Committee hearings, much of NOAA's environmental data "is at serious risk due to deteriorating storage media." NOAA estimates that approximately half of its on-hand data is presently unusable. Also, the National Weather Service has requested approximately \$55 million for modernization, including an increase for Next Generation Radar (NEXRAD), Automated Surface Observing System (ASOS), and purchase of a class IV supercomputer. See Committee on Appropriations, Subcommittee on the Department of Commerce, Justice, and State, the Judiciary, and Related Agencies, Hearings before a Subcommittee of the Committee on Appropriations (Part I), 102nd Cong., 1st Sess. (1991).
59. Fleagle, *op. cit.*, note 55 above.
60. National Commission on the Environment, *op. cit.*, note 3 above.
61. Dr. Peter Raven, Director of the Missouri Botanical Garden, and others have described the need for national biological inventories.
62. Congressional Research Service, "Federal R&D in Environmental Technologies," coordinated by John D. Moteff, July 17, 1992.
63. Marc H. Ross and Robert H. Socolow, "Fulfilling the Promise of Environmental Technology," *Issues in Science and Technology* 7(3):61-66, 1991.
64. Robert W. Fri, "Organizing Federal Programs to Support the Development of Environmental Technologies," testimony before the U.S. Senate Committee on Governmental Affairs, July 21, 1992.
65. Harvey Brooks, "Innovation and Competitiveness," a symposium lecture in memory of J. Herbert Holloman, April 9, 1991.
66. The Office of National Environmental Technologies Act of 1992 (H.R. 5959) was introduced by Congressman Joseph P. Kennedy on September 16, 1992.
67. U.S. General Accounting Office, Earth Observing System: NASA's EOSDIS Development Approach Is Risky, GAO/IMTEC-92-24, Washington, DC, February 1992.
68. Kenneth Olden, National Institute of Environmental Health Sciences, "Environmental Research and Education: Needs and Opportunities," prepared for the University Colloquium on Environmental Research and Education, Raleigh, North Carolina, September 24-26, 1992.
69. Public Health Service, Department of Health and Human Services, Evaluating the Environmental Health Work Force, publication HRP 0907160, January 1988.
70. National Research Council, Board on Environmental Studies and Toxicology, *Science in the National Parks*, National Academy Press, Washington, DC, 1992.
71. *Ibid.*
72. *Ibid.*
73. National Research Council, Board on Environmental Studies and Toxicology, *Hazardous Materials on the Public Lands*, National Academy Press, Washington, DC, 1992.
74. *Ibid.*
75. National Research Council, *Investing in Research: A Proposal to Strengthen the Agricultural, Food, and Environmental System*, National Academy Press, Washington, DC, 1989.

76. Office of Technology Assessment, *Agricultural Research and Technology Transfer Policies for the 1990s*, March 1990, pp. 3, 7.
77. Carnegie Commission on Science, Technology, and Government, *op. cit.*, note 1 above.
78. Draft Final Report of the Secretary of Energy Advisory Board Task Force on the Department of Energy National Laboratories, January 29, 1992.
79. Executive Office of the President, *U.S. Actions for a Better Environment: A Sustained Commitment*, Washington, DC, 1992.
80. International Conference on an Agenda of Science for Environment and Development into the 21st Century (ASCEND 21), Vienna, Austria, November 25-29, 1991, organized by the International Council of Scientific Unions (ICSU) in cooperation with the Third World Academy of Sciences (TWAS).
81. S. 2866, introduced in the 102nd Congress, establishes a program to assist in the deployment of energy and environmental practices and technologies; the program would be called the "ADEPT" program.
82. Carnegie Commission on Science, Technology, and Government, *International Environmental Research and Assessment: Proposals for Better Organization and Decision Making*, July 1991, p. 22.
83. Alexander Keynan, "The United States as a Partner in Scientific and Technological Cooperation: Some Perspectives from Across the Atlantic," Consultant report to the Carnegie Commission on Science, Technology, and Government, June 1991.
84. U.S. Environmental Protection Agency, *Unfinished Business*, Washington, DC, 1987.
85. U.S. Environmental Protection Agency, *Reducing Risk: Setting Priorities and Strategies for Environmental Protection*, Washington, DC, September 1990.
86. Ecological Society of America, "Sustainable Biosphere Initiative: An Unecological Research Agenda," reprinted from *Ecology* 72(2), April 1991.
87. Carnegie Commission on Science, Technology, and Government, *The Limits of Government in Science and Technology: Roles and Challenges for Nongovernmental Organizations*, in press.
88. Charles W. Powers, *op. cit.*, note 33, above.
89. *Ibid.*
90. Kathleen M. Gramp, Albert H. Teich, and Stephen D. Nelson, "Federal Funding of Environmental R&D," a report to the National Academy of Sciences and the Carnegie Commission on Science, Technology, and Government by the American Association for the Advancement of Science.
91. A number of these programs were discussed at the University Colloquium on Environmental Research and Education held in Raleigh, North Carolina, on September 24-26, 1992. Information on the proceedings of the Colloquium may be obtained from Sigma Xi, the Scientific Research Society, 99 Alexander Drive, PO Box 13975, Research Triangle Park, NC 27709.
92. Lester R. Brown, "Launching the Environmental Revolution," in *State of the World 1992*, Worldwatch Institute, W. W. Norton, New York, 1992, p. 175.
93. Jim MacNeill, Director of the Environment and Sustainable Development Program at the Institute for Research on Public Policy in Ottawa, Canada, quoted in Cheryl Simon Silver with Ruth S. DeFries, *op. cit.*, note 7 above, p. 60.
94. *Regulatory Program of the U.S. Government, 1 April 1990 - 31 March 1991*, p. vii.
95. Steven J. Kafka, *op. cit.*, note 16 above, Figure 3, p. 10.
96. *An Evaluation of EPA's Exploratory Grants Program*, a report prepared for OER by American Management Systems, Inc., April 1988.
97. National Academy of Public Administration, *EPA's Office of Research and Development: Leadership and Staff for a New Agenda*, July 1990.
98. *An Evaluation of EPA's Exploratory Research Grants Program*, *op. cit.*, note 96 above.
99. U.S. Environmental Protection Agency, *Safeguarding the Future: Credible Science, Credible Decisions*, March 1992.
100. National Research Council, *Environmental Monitoring and Assessment Program: Interim Report*, National Academy Press, Washington, DC, June 1992.
101. National Science Foundation FY 1992 Budget Justification.
102. This figure does not include \$265 million to support the National Environment Satellite, Data, and Information Service.

103. Robert E. Chapman, U.S. Department of Commerce, "Benefit-Cost Analysis for the Modernization and Associated Restructuring of the National Weather Service," NISTIR 4867, July 1992.
104. Gramp *et al.*, *op. cit.*, note 90 above.
105. Department of the Interior FY 1992 Budget Justification.
106. National Research Council, Committee to Review the Outer Continental Shelf Environmental Studies Program, *The Adequacy of Environmental Information for Outer Continental Shelf Oil and Gas Decisions: Florida and California*, National Academy Press, 1989; Physical Oceanography Panel, *Assessment of the U.S. Outer Continental Shelf Environmental Studies Program*, National Academy Press, Washington, DC, 1990; Ecology Panel, *Assessment of the U.S. Outer Continental Shelf Environmental Studies Program*, National Academy Press, Washington, DC, 1992.
107. 43 USC, March 3, 1879.
108. U.S. General Accounting Office, *op. cit.*, note 67 above.
109. NIEHS FY 1992 Budget Justification, p. 121.
110. NIOSH FY 1992 Budget Justification, p. 487.
111. Gramp *et al.*, *op. cit.*, note 90 above.
112. *Ibid.*
113. National Research Council, Board on Agriculture, *Investing in Research: A Proposal to Strengthen the Agricultural, Food, and Environmental System*, National Academy Press, Washington, DC, 1989.
114. National Research Council, *Alternative Agriculture*, National Academy Press, Washington, DC, 1989.
115. National Research Council, *Plant Biology Research and Training for the 21st Century*, National Academy Press, Washington, DC, 1992.
116. Keith Schneider, "Military Has New Strategic Goal in Cleanup of Vast Toxic Waste," *New York Times*, 5 August 1991.
117. Smithsonian Institution Office of Environmental Awareness, "Environmental Conservation Activities at the Smithsonian Institution, 1992-1993."

MEMBERS OF THE CARNEGIE COMMISSION ON SCIENCE,
TECHNOLOGY, AND GOVERNMENT

William T. Golden (Co-Chair)
Chairman of the Board
American Museum of Natural History

Joshua Lederberg (Co-Chair)
University Professor
Rockefeller University

David Z. Robinson (Executive Director)
Carnegie Commission on Science,
Technology, and Government

Richard C. Atkinson
Chancellor
University of California, San Diego

Norman R. Augustine
Chair & Chief Executive Officer
Martin Marietta Corporation

John Brademas
President Emeritus
New York University

Lewis M. Branscomb
Albert Pratt Public Service Professor
Science, Technology, and Public Policy
Program
John F. Kennedy School of Government
Harvard University

Jimmy Carter
Former President of the United States

William T. Coleman, Jr.
Attorney
O'Melveny & Myers

Sidney D. Drell
Professor and Deputy Director
Stanford Linear Accelerator Center

Daniel J. Evans
Chairman
Daniel J. Evans Associates

General Andrew J. Goodpaster (Ret.)
Chairman
Atlantic Council of The United States

Shirley M. Hufstедler
Attorney
Hufstедler, Kaus & Ettinger

Admiral B. R. Inman (Ret.)

Helene L. Kaplan
Attorney
Skadden, Arps, Slate, Meagher & Flom

Donald Kennedy
Bing Professor of Environmental Science
Institute for International Studies and
President Emeritus
Stanford University

Charles McC. Mathias, Jr.
Attorney
Jones, Day, Reavis & Pogue

William J. Perry
Chairman & Chief Executive Officer
Technology Strategies & Alliances, Inc.

Robert M. Solow
Institute Professor
Department of Economics
Massachusetts Institute of Technology

H. Guyford Stever
Former Director
National Science Foundation

Sheila E. Widnall
Associate Provost and Abby Mauze
Rockefeller Professor of Aeronautics
and Astronautics
Massachusetts Institute of Technology

Jerome B. Wiesner
President Emeritus
Massachusetts Institute of Technology

MEMBERS OF THE ADVISORY COUNCIL,
CARNEGIE COMMISSION ON SCIENCE,
TECHNOLOGY, AND GOVERNMENT

Graham T. Allison, Jr.
Douglas Dillon Professor of Government
John F. Kennedy School of Government
Harvard University

William O. Baker
Former Chairman of the Board
AT&T Bell Telephone Laboratories

Harvey Brooks
Professor Emeritus of Technology and
Public Policy
Harvard University

Harold Brown
Counselor
Center for Strategic and International
Studies

James M. Cannon
Consultant
The Eisenhower Centennial Foundation

Ashton B. Carter
Director
Center for Science and International
Affairs
Harvard University

Richard E. Celeste
Former Governor
State of Ohio

Lawton Chiles
Governor
State of Florida

Theodore Cooper
Chairman & Chief Executive Officer
The Upjohn Company

Douglas M. Costle
Former Administrator
U.S. Environmental Protection Agency

Eugene H. Cota-Robles
Special Assistant to the Director
National Science Foundation

William Drayton
President
Ashoka Innovators for the Public

Thomas Ehrlich
President
Indiana University

Stuart E. Eizenstat
Attorney
Powell, Goldstein, Frazer & Murphy

Gerald R. Ford
Former President of the United States

Ralph E. Gomory
President
Alfred P. Sloan Foundation

The Reverend Theodore M. Hesburgh
President Emeritus
University of Notre Dame

Walter E. Massey
Director
National Science Foundation

Rodney W. Nichols
Chief Executive Officer
New York Academy of Sciences

David Packard
Chairman of the Board
Hewlett-Packard Company

Lewis F. Powell, Jr.*
Associate Justice (Ret.)
Supreme Court of the United States

Charles W. Powers
Managing Senior Partner
Resources for Responsible Management

James B. Reston
Senior Columnist
New York Times

MEMBERS OF THE ADVISORY COUNCIL

143

Alice M. Rivlin
Senior Fellow
Economics Department
Brookings Institution

Oscar M. Ruebhausen
Retired Presiding Partner
Debevoise & Plimpton

Jonas Salk
Founding Director
Salk Institute for Biological Studies

Maxine F. Singer
President
Carnegie Institution of Washington

Dick Thornburgh
Undersecretary General
Department of Administration and
Management
United Nations

Admiral James D. Watkins (Ret.)*
Former Chief of Naval Operations

Herbert F. York
Director Emeritus
Institute on Global Conflict and
Cooperation
University of California, San Diego

Charles A. Zraket
Trustee
The MITRE Corporation

* Through April 1990

** Through January 1989

MEMBERS OF THE TASK FORCE ON THE ORGANIZATION
OF FEDERAL ENVIRONMENTAL R&D PROGRAMS

Robert W. Fri, Co-Chair
H. Guyford Stever, Co-Chair

Douglas M. Costle
Edward A. Frieman

Stephen J. Gage

Bruce W. Karth

Gordon J. F. MacDonald

Gilbert S. Omenn

David P. Rall

Gilbert F. White

Mark Schaefer, Senior Staff Associate

REPORTS OF THE CARNEGIE COMMISSION ON SCIENCE, TECHNOLOGY, AND GOVERNMENT

Science & Technology and the President (October 1988)

E¹: Organizing for Environment, Energy, and the Economy in the Executive Branch of the U.S. Government (April 1990)

New Thinking and American Defense Technology (August 1990)

Science, Technology, and Congress: Expert Advice and the Decision-Making Process (February 1991)

Technology and Economic Performance: Organizing the Executive Branch for a Stronger National Technology Base (September 1991)

In the National Interest: The Federal Government in the Reform of K-12 Math and Science Education (September 1991)

Science, Technology, and Congress: Analysis and Advice from the Congressional Support Agencies (October 1991)

Science and Technology in U.S. International Affairs (January 1992)

International Environmental Research and Assessment: Proposals for Better Organization and Decision Making (July 1992)

Enabling the Future: Linking Science and Technology to Societal Goals (September 1992)

Science, Technology, and the States in America's Third Century (September 1992)

Partnerships for Global Development: The Clearing Horizon (December 1992)

A Science and Technology Agenda for the Nation: Recommendations for the President and Congress (December 1992)

Future reports are expected on the following topics:

- Nongovernmental Organizations
- National Security
- Science, Technology, and Congress
- Science and Technology in Judicial Decision Making
- Science and Technology in Regulatory Decision Making
- Final Report

Copies are available free of charge from:

The Carnegie Commission on Science, Technology, and Government
10 Waverly Place, 2nd Floor
New York, NY 10003
(212) 998-2150, Fax (212) 995-3181

CHOOSING A SUSTAINABLE FUTURE

*The Report of the National Commission
on the Environment*

ISBN 0-8018-5111-5

Washington, D.C. □ Corvallis, California

CRISIS AND OPPORTUNITY

We, the members of the National Commission on the Environment, are convinced that the natural processes that support life on Earth are increasingly at risk and that by choosing to act or not to act to confront this risk now, our country is choosing between two very different futures. If America continues down its current path, primarily reacting to environmental injuries and trying to repair them, the quality of our environment will continue to deteriorate, and eventually our economy will decline as well. If, however, our country pioneers new technologies, shifts its policies, makes bold economic changes, and embraces a new ethic of environmentally responsible behavior, it is far more likely that the coming years will bring a higher quality of life, a healthier environment, and a more vibrant economy for all Americans.

U.S. leadership should be based on the concept of *sustainable development*. By the close of the twentieth century, economic development and environmental protection must come together in a new synthesis: broad-based economic progress accomplished in a manner that protects and restores the quality of the natural environment, improves the quality of life for individuals, and broadens the prospects for future generations. This merging of economic and environmental goals in the concept of sustainable development can and should constitute a central guiding principle for national environmental and economic policymaking.

Sustainable development is predicated on the recognition that economic and environmental goals are inextricably linked. Long-term growth depends on a sound environment, and resources to protect the environment will come from economic strength. Both goals—that is, environmental and economic health—are intended to improve the quality of life of individuals, communities, and society. To the extent that either environmental or economic policy impoverishes the quality of life, it has failed.

The choice between crisis and sustainable development is one that our nation shares with the rest of the world. It must be addressed through international cooperation and by U.S. commitment to action at home and leadership abroad. As the world's single largest economy, the largest user of natural resources, the largest producer and consumer of energy, and the largest producer of carbon dioxide pollution, the United States has a special responsibility to exercise world leadership. Indeed, a commitment to such leadership is essential. The complexity and scope of current environmental challenges demand the ingenuity, expertise, and technology for which the United States is famous.

Over the past 20 years, an impressive array of federal, state, and local pollution control and resource management programs, both public and private, have been instituted in the United States. Total U.S. expenditures on environmental protection now average more than 2 percent of the gross national product annually. The United States has had the foresight to adopt stringent environmental laws and regulations and to make sizable economic investments in pollution control and energy efficiency. As a result, our nation has not had to contend with landscapes as blighted, air and water as polluted, soils as poisoned, or public health as ravaged as in Central and Eastern Europe. The measurable environmental progress made by the United States should be a source of national pride.

Still, our country's environmental achievements should not lull Americans into complacency. Despite numerous victories, the United States is losing many battles:

- + *Global environmental problems* to which the United States makes no small contribution—loss of biodiversity, climate change, and stratospheric ozone depletion, for instance—are placing both human and natural systems at grave risk.

- + The *air* in U.S. cities threatens to deteriorate further as improvements in auto emission controls are overwhelmed by the sheer numbers of cars and miles driven and by congestion. Meanwhile, indoor air pollution is largely ignored.
- + Disposal and cleanup of the vast amounts of *waste* generated each year pose great difficulties and consume an increasing proportion of the limited funds available for environmental protection. Indirect sources of pollution, such as urban and agricultural runoff, continue almost unabated.
- + Encroaching *land development* is displacing and undermining critical ecosystems such as wetlands and threatens rural landscapes, natural areas, and biological diversity.
- + Large areas of national forest and other *public lands and resources* are not managed sustainably.
- + *Farmlands* are suffering from soil loss and excessive use of chemicals.
- + *Freshwater aquifers* are being consumed and contaminated at an alarming rate in many areas.
- + *Overfishing and pollution* are seriously depleting our most important commercial fisheries.
- + In many U.S. *inner cities*, the physical environment has the look of a wasteland.

This litany of environmental ills, familiar-sounding and by no means complete, is a product of today's level and character of economic activity and human population. We must also consider tomorrow. Over the next 50 years—within the lifetimes of many of us and of all our children—economic activity in the United States is projected to quadruple and global population to double at least. If growth of this magnitude occurs with current industrial processes, agricultural methods, and consumer practices, the results could be both environmentally and economically disastrous.

Forecasts based on linear projections are often wrong. In the case of environmental conditions, such projections may be too optimistic.

Ample evidence suggests that unless our nation acts decisively now, the price will be serious—in some instances irreversible—environmental harm. Undoubtedly, technology and manufacturing processes will evolve over the next 50 years, in some cases outstripping our imagination. However, in view of the fact that the versatile but polluting combustion engine is still with us, despite waves of technological innovation over the past century and our growing knowledge of how to bring alternatives on line, it would be the height of folly for our nation to sit back and simply hope that the future will be “greened” by an invisible hand. The United States must take deliberate steps to shape the future now.

Short-term needs are always more readily placed ahead of long-term goals and personal desires ahead of societal ones. Excuses for inaction—budget deficits, opposition to taxes, foreign competition—abound. Yet the continuing pursuit of “politics as usual” will almost certainly guarantee failure.

As history teaches, the only defense against political inertia is leadership, and in this regard environmental issues are no exception. The American public must insist that its leaders understand the stark realities of the environmental challenge. Leaders in business, government, labor, education, and the environmental community have to muster the political will to bring the nation together to face its problems head-on. Now more than ever, the American public has to become an informed, concerned, and committed public that will demand such leadership.

The United Nations Conference on Environment and Development, which met in Rio de Janeiro in June 1992, was an important beginning for the process of providing a new environmental agenda based on the concept of sustainable development. The need now is to translate that broad agenda into specific national action plans. Among other things, this report and the recommendations within it contain the ingredients of such a plan for the United States.

The course we chart will not be easy. Periodic adjustments will undoubtedly have to be made to minimize short-term economic and other difficulties. But there must be an end to U.S. ambivalence about the environment and a beginning of a steadfast commitment to improving the environment both nationally and internationally. *The United States must have a long-term strategy for pursuing the goal of sustainable development.* Such a balanced strategy should be able to antici-

pate and avoid severe local and regional economic dislocations and stimulate adjustment assistance and job retraining.

As we stated at the outset, economic and environmental well-being are mutually reinforcing goals that must be pursued simultaneously if either is to be achieved. Economic growth cannot be sustained if it continues to undermine the healthy functioning of the Earth's natural systems or to exhaust natural resources. By the same token, only healthy economies can generate the resources necessary for investments in environmental protection.

Poverty is the enemy of the environment. Environmental protection is not possible where poverty is pervasive and the quality of life degraded. For this reason, one of the principal objectives of environmental policy must be to ensure a decent standard of living for all.

Innovations made to achieve sustainable development will themselves bring major economic benefits. The economic advantage of using materials and energy efficiently is obvious, and the domestic production and use of environmentally sound technologies will reap profits both for the U.S. firms that sell them and for those who use them.

The most efficient way to achieve environmental progress, therefore, is to harness market forces. Here, the role of public policy is to send the right signals to the economy—"getting the prices right" and making the marketplace work for instead of against environmental protection. Taxes and subsidies can be used to ensure that prices reflect environmental costs.

We harbor no illusions that market economics alone will put the United States or the world on the path to sustainable development. Government regulations and private and individual initiatives are also required. Regrettably, the U.S. statutory and regulatory system is woefully inadequate, cumbersome, and sometimes even perverse with respect to environmental issues. A regime that now emphasizes "end-of-the-pipe" cleanup must be radically reformed into one that makes use of economic incentives and encourages pollution prevention. Changing product design or manufacturing processes to minimize or prevent pollution is obviously superior to mandating expensive cleanups after the fact. And an environmentally literate public can encourage such efforts by demanding environmentally acceptable products.

If environmental prevention is to prevail over environmental cure and if the United States is to remain an international industrial leader, our country must rapidly develop and deploy a wide array of new, more efficient, and environmentally safe technologies. This need for new technology is particularly acute in the realms of transportation and energy generation because these activities currently account for so much environmental degradation.

Simply put, there must be a deep-seated change in how our country produces and uses energy. No single area of activity is so closely interwoven with the environment. Were it not for the world's large reliance on fossil fuels for both energy production and transportation, the problems of global warming, acid rain, and urban smog would be relatively minor. A progressive shift away from fossil fuels as quickly as possible in both the energy and transportation sectors is crucial. Because the United States uses in excess of one-fourth of the world's energy, largely generated by fossil fuels, it must be a leader in developing other energy sources.

Economic incentives dramatically different from those now in force are required. Coal, oil, and gas prices, for instance, must reflect the environmental costs associated with their combustion. Over the long term, the United States must shift to alternative nonpolluting sources of energy, principally from renewable sources. In the interim, the country must develop technologies that use energy more efficiently and thereby consume less fuel. A federal carbon tax should be phased in to move the economy in this direction and away from reliance on fossil fuels.

In transportation, the long-range need is a shift in auto technology to alternative sources of energy that will pollute our cities less. This will require incentives for more fuel-efficient autos and for fewer miles driven, as well as for new technologies such as electricity and, in the longer term, hydrogen. To curb current pollution levels, the federal gasoline tax should be raised gradually and predictably over several years—for example, by about \$0.20 each year for five years. We believe that only an increase of this magnitude will work to change driving patterns and technological development. Even with this tax, the cost of gasoline in the United States would remain about the same price (in constant dollars) as the cost of premium gas here in 1981. Because of the potentially regressive impact of gasoline taxes, a system of tax credits or rebates could be used to offset hardships.

In agriculture, in manufacturing processes, in consumer products, and in almost every other sector of the economy, new technologies will give the United States a competitive edge as well as a healthier environment. The worldwide market for such technologies will continue to grow as the connections between environmental and economic well-being become more apparent. The economic potential of trade in such technologies is no secret; Japan and Germany, among others, have already moved aggressively into this field. If America moves ahead in this technology race, it will be because our country has at last understood that we need a technological revolution, not just another technical fix.

Along with dramatic economic opportunities, a commitment to sustainable development could bring timely new political opportunities, particularly in foreign affairs. With the end of the Cold War and the Communist threat, the bond that held the United States and its allies together for half a century has loosened. The international community is breaking into national or (at best) regional groupings pursuing their own narrow self-interests. Prospects for sustainable development could shatter in such a divided world. We are convinced that the urgent need to put the world on the road to sustainability provides a common purpose that can and must unite the global community.

While the principal thrust of this report is to recommend measures for putting America's environmental house in order, the United States has a huge stake in effectively addressing global environmental problems. As Barbara Ward and Rene Dubos said, all of us have two countries—"our own and Planet Earth." The threat of global climate change, for example, requires national initiatives in the United States, but the problem really can be addressed only through a common worldwide effort. The destruction of forests will exacerbate global warming and accelerate the loss of species and ecosystems, foreclosing medical, recreational, and trade opportunities for the United States as well as diminishing the world's shared biological heritage. The great potential for expanding trade with developing countries will not be realized unless these nations achieve sustainable development. U.S. national security interests depend increasingly on achieving a level of international stability that can come only from sustainable development.

The most critical need facing the world is the control of human numbers. Continued global population growth of the current magni-

tude—one billion more people every decade—will swamp economic and social progress as well as efforts to protect the environment. Our nation and all others will gain from efforts to stabilize world population and to improve living standards in developing countries, where 90 percent of the projected population growth will occur. The burden placed on the environment is a product of population and consumption. The priorities for the developed countries are to switch to sustainable technologies and to reduce wasteful consumption; the priorities for the developing countries are to develop sustainably and curb population growth.

The United States must make a major commitment to cooperate with the world community to stabilize global population, recognizing the linkages between birth rates, child survival, economic development, education, and the economic and social status of women. Universal access to effective family-planning information, contraceptives, and health care is essential. We recommend a reversal of the U.S. policy that prohibits funding to certain family-planning organizations, and we urge greatly increasing U.S. funding of international population programs and of economic assistance to developing countries.

A key failure in the U.S. effort to address environmental needs has been the widespread failure to recognize the need for effective land-use planning. We do not suggest that the federal government should preempt the traditional roles of state and local governments in this area. The federal government must lead the way by managing its own lands consistent with the principle of sustainable development. State and local governments as well as other regional groups should undertake land-use planning for a variety of reasons: to protect environmentally sensitive areas, including watersheds, aquifers, and wetlands; to maintain biological diversity; to sustain the productivity of agricultural land; to ensure that sites for economic activity are appropriate and available; to encourage energy efficiency; and to protect sites of natural beauty and of historic and cultural value. To help make land use consistent with the overarching goal of sustainable development, we recommend the enactment of federal legislation that encourages state and regional authorities to develop land-use planning procedures based on such criteria.

Sustainable development depends on integrating environmental values into policy and decisionmaking across an entire spectrum of governmental functions. To facilitate integration as well as the major

changes in current environmental policies that we envision, a cabinet-level Department of the Environment is needed—not just an elevated Environmental Protection Agency, but a department with additional functions and roles. This department cannot be exclusively or primarily regulatory but must also be able to formulate and oversee the implementation of a National Environmental Strategy. It can spearhead a radical revision of our country's pollution control laws to encourage innovation, pollution prevention, and more coherent, cross-media approaches. The President and Congress should be united on such a goal and on the overall national and global strategy.

As human population inevitably will continue to increase for the next half-century or more, and as sustainable development will not be an easy accomplishment, citizens must learn to devote themselves to the achievement of long-term goals, not just short-term satisfactions. The nation must stop stealing the environmental capital of future generations and must live instead on its fair share of nature's interest.

An informed citizenry with an ethical commitment to care for the environment is essential to the future we envision. Success with the technological, economic, and governmental changes that we recommend is predicated on the understanding and wholehearted support of the American people. Environmental values must be integrated into the lifestyles of individuals and families as well as into the conduct of businesses, labor, and governments.

To this end, the nation as a whole and especially its schools must pledge themselves to the goal of environmental literacy. U.S. citizens must have the knowledge, practical competence, and moral understanding to cooperate in building a sustainable civilization. The pursuit of environmental literacy will require curricular innovations from kindergarten through college, changes in teacher education programs, expanded graduate programs, and continuing education, both formal and informal. Enhanced science research will improve our knowledge of ecosystems, habitats, and public health and will add to environmental literacy.

All of us must develop a greater sense of ethical responsibility for the environment. Environmental ethics are founded on an awareness that humanity is part of nature and that nature's myriad parts are interdependent. In any natural community, the well-being of the individual and of each species is tied to the well-being of the whole. In a world

increasingly without environmental borders, each individual and every nation has a fundamental ethical responsibility to respect nature and to care for the Earth, protecting its life-support systems, biodiversity, and beauty. In this extraordinarily interdependent world, each person should feel an ethical responsibility not only to a local or national community but to the larger global community and to future generations.

It is only within such a framework that the values to sustain and guide us will be found as we move toward the goal of sustainable development. Schools, religious institutions, and the news media as well as businesses, governments, and (perhaps above all) families must share in the tasks of achieving this aim.

We have a vision for the future: a vision of an America and a world in which humanity lives and prospers in harmonious, sustainable balance with the natural systems of the Earth. America has an opportunity to rise to the challenge of environmental leadership as it has to the causes of human liberty, equality, and free and open markets. The challenge starts at home.

This introductory statement summarizes the main focuses of the Commission's thinking as well as its principal recommendations. Detailed discussion and additional recommendations are found in the full report.

PREPARED STATEMENT OF JAY D. HAIR

Good Morning, Mr. Chairman. I am grateful for the opportunity to testify before you today to urge that S. 171 be passed in this Congress to place the Environmental Protection Agency in the Cabinet. Elevation of EPA to Cabinet level is long overdue. It is time to formally acknowledge that environmental protection is as vital to our nation as defense, commerce, veterans affairs, and education.

You, Mr. Chairman are to be applauded for once again taking the lead on this vital issue. You have shown unflinching commitment to EPA elevation through the difficulties and disappointments of the last two sessions of Congress. Let's hope that by Earth Day, April 22nd, your efforts will have finally come to fruition.

Before I begin, it might be helpful for the Committee to have some background about the National Wildlife Federation (NWF) and its work. The Federation is the Nation's largest conservation education organization. Founded in 1936, the Federation, its 5.3 million members and supporters, and its affiliated state organizations work to educate and empower individuals and organizations to conserve natural resources, protect the environment and build a globally sustainable future environment for our children.

I will address, briefly, three broad and compelling reasons for elevating EPA to cabinet level.

First, the protection of the Nation's environment is critical to the quality of life of every U.S. citizen and to the country's economic vitality. Therefore, environmental concerns must be central in the deliberations of the Nation's highest policy making forum—the Cabinet.

The Environmental Protection Agency touches the lives of every citizen and is a factor in business and governmental decisions across a wide range of issues. The Agency administers laws which require it to gauge the risks to human health from chemicals and pollutants; it must ascertain and publish the fuel economy of automobiles; it must monitor the quality of air and water and make sure it meets predetermined standards; it influences industries ranging from public utilities to cattle feedlots.

The time has come to give EPA a place at the Cabinet table, where its leader can be a part of deliberations which bear upon the spending of billions of dollars and influence the destiny of citizens. This nation must have a Department of the Environment which has the authority to address long-festering problems of air and water pollution, wetlands loss, pesticide hazards, and toxic waste cleanups. Moreover, we need a Secretary of the Environment who can negotiate, at equal rank, with the Secretaries of Energy and Defense over the clean up of nuclear and other hazardous wastes that are products of their Departments' activities.

Second, protecting the environment and conserving natural resources is a global issue, requiring strong, aggressive U.S. leadership.

From global warming to ozone depletion, it is apparent that the environment must be confronted as a global as well as a national issue. It is time for the Nation's primary environmental institution to be accorded a priority position commensurate with the challenges that it faces.

Unprecedented cooperation among nations will be needed to tackle transboundary environmental problems. In its current status, EPA is unable to directly negotiate on issues like global warming and ozone depletion because international protocol reserves that authority to Cabinet-level officials. There is no better illustration of this point than the position of U.S. officials at last June's Earth Summit in Rio. Negotiations on global environmental issues on behalf of the United States were led by the State Department while EPA officials were relegated to a supporting role. It is astonishing that the United States is one of the few nations that does not have a cabinet-level ministry or department for the environment.

Passage of legislation that would create a U.S. Department of the Environment would demonstrate our commitment, at the highest level of our government, to join with other nations in tackling global environmental problems.

Finally, I want to touch on a thread that weaves through my other two points: The need, both in this country and abroad, to make environmental protection the centerpiece of economic growth.

One of the major challenges of this decade will be to incorporate environmental stewardship into our way of doing business. In contrast to the theme of the Reagan-Bush years that the Nation must choose economic growth or environmental protection, it is becoming increasingly clear that environmental protection is critical to economic competitiveness. Economies resting on a dwindling, deteriorating resource base are doomed to stagnation and failure.

Making environmental protection integral to economic growth depends, to an important extent, on our initiative in developing and using technologies that will both ameliorate existing pollution problems and prevent further deterioration of this nation's and the world's environment.

As we develop the technologies needed to address the world's environmental problems, we will also stimulate greater economic growth in this country. Foreign nations will come to the United States to provide technical assistance to implement environmental policies or clean up current environmental trouble spots. When people in Eastern Europe want to make their air cleaner or rivers less polluted or when people in sub-Saharan Africa want information on sustainable agricultural development or deforestation, they should be able to look to the United States to address their concerns. A clean environment is not only necessary, it is good business.

The United States cannot afford to lag in the development of environmental technologies. The Organization for Economic Cooperation and Development (OECD) has reported that 800,000 people in the U.S. are currently employed in environmental industries—from managing waste to designing more energy efficient consumer products. OECD estimates that the world market for environmental technologies will grow from the current \$200 billion to \$300 billion a year by the year 2000. Both Germany and Japan have recognized the potential economic benefit and growth of environmental industries. Those countries are already investing in environmental research and development—as we must continue to do.

In addition to elevating EPA, S. 171 establishes a Bureau of Environmental Statistics within the EPA, a Presidential Commission on improving environmental protection, and also urges the convening of an international meeting on energy efficiency and renewable resources. These provisions will improve EPA's performance in important areas and we support them.

In closing, the quality of life of our citizens and the strength of our economy depend on a healthy environment. Our survival, and that of our children, requires that we address global environment concerns. Creation of a Department of the Environment will demonstrate our nation's commitment to meeting environmental challenges in this country and around the world. A Department of the Environment is long past due *if* we are to get the job done.

I thank you for the opportunity to present our views on this important matter, and am pleased to answer any questions the Committee may have.

PREPARED STATEMENT OF STEPHEN J. GAGE

My name is Stephen J. Gage. I am president of the Cleveland Advanced Manufacturing Program (CAMP) in Cleveland, Ohio. From 1974 to 1980, I was employed by the U.S. Environmental Protection Agency here in Washington, D.C. During the Carter Administration, I served as the Assistant Administrator for Research and Development under Administrator Douglas M. Costle. Before joining CAMP, I ran the State of Indiana's seed capital investment program. Recently I served on a Carnegie Commission on Science, Technology, and Government task force which reviewed the organization of Federal environmental research and development.

I am pleased to have the opportunity today to comment on S. 171 and on several related matters including a recent report from the Carnegie Commission Task Force and the Federal role in developing environmental control technology.

Importance of S. 171

First, Mr. Chairman, I would like to add my support to your efforts to elevate the U.S. Environmental Protection Agency to cabinet status. Each passing year makes it more essential to have a Secretary of the Environment in the President's Cabinet. This is an idea whose time arrived during the past few years as we finally awakened to realize that the Earth's life support systems are indeed fragile and threatened. S. 171 should be passed as soon as possible.

I understand that politics is the "art of the possible," that we should move deliberately. I hope, though, that elevation of EPA to cabinet status is just the first step of a general reorganization of environmental programs within the Federal Government. If a Department of the Environment is to serve the best interests of Americans, it must be driven by more than just regulations. Otherwise we should leave it as an independent regulatory agency.

A Department of the Environment, I am confident, can meet our regulatory needs. The Food and Drug Administration and the Occupational Safety and Health

Administration are examples of critical regulatory agencies in large cabinet departments. But a Department of the Environment needs to do more than regulate.

One thing that the Department should do is to maintain a better balance between its regulatory efforts and its commitment to good science and technology as the basis for understanding the environment and dealing with threats to it. The Department should have cognizance over monitoring the quality of the U.S. and global environment and promptly reporting positive and negative trends. I'll return to this issue later. Finally, the Department should have the Federal lead on environmental issues—from cleaning up past abuses at home to stemming environmental devastation globally.

Progress in R&D at EPA

It should be recognized that EPA has recently made progress in stabilizing its science and technology efforts. Its Office of Research and Development (ORD) has, over the last several years, taken modest but important steps in reorganizing and streamlining its activities. ORD has consolidated two environmental engineering research laboratories in Cincinnati, OH, into one laboratory. It has consolidated two environmental health effects research laboratories into one located at Research Triangle Park, NC. And it has consolidated an air modeling laboratory and an air monitoring laboratory in North Carolina into one.

ORD should also be commended for recompeting the awards for the university-based Centers of Excellence this past year. This was a positive step in reinvigorating the important work ORD supports in universities. The five centers selected, however, are still seriously underfunded. In fact, the ever-increasing scope of environmental problems demand more and better-funded Centers.

During the past year, too, EPA has focused greater attention on environmental technologies. Playing an active role in the National Technological Initiative, EPA has gained better insight into the roles of private industry, private capital, and market barriers in technology commercialization.

These are useful steps but do not address the basic challenges facing the Nation and the world in dealing with current and past pollution.

The Carnegie Commission on Science, Technology, and Government Report on Federal Environmental R&D Programs

Since 1988, the Carnegie Commission on Science, Technology, and Government has commissioned a number of studies. As mentioned above, I had the privilege of serving on its Task Force on the Organization of Federal Environmental R&D Programs. The report of that task force was issued in December 1992.¹

While many of the task force's findings and recommendations are relevant to this hearing today, I would like to highlight five of the recommendations which are especially germane to the development of environmental control technologies:

- The President, with the guidance and support of Congress, should undertake an Environmental Research and Monitoring Initiative, a long-term effort to bring all Federal environmental R&D programs into a common policy framework.

The Initiative should be guided by the Director of the Office of Environmental Quality and the Director of the Office of Science and Technology Policy (OSTP) and should involve key administrators of Federal R&D programs, as well as the Office of Management and Budget (OMB). The group should work to devise coherent short- and long-term R&D plans for each agency and department.

- The Office of Science and Technology Policy should coordinate a broader array of environmental R&D activities.

OSTP should use the Federal Coordinating Council on Science, Engineering, and Technology (FCCSET) to aid in the development of coherent Federal environmental R&D programs and to address problems that cut across departments and agencies. Close interaction between OSTP and the Office of Environmental Quality and between OSTP and OMB is essential to achieve an integrated, forward-looking environmental protection program.

- A new Federal agency, the U.S. Environmental Monitoring Agency, should be organized by combining the National Oceanic and Atmospheric Administration, now within the Department of Commerce, with the U.S. Geological Survey, now within the Department of the Interior.

Monitoring, mapping, inventorying, and forecasting with respect to the national and global environment are the cornerstones of Federal environmental protection efforts. Two key players in these efforts are NOAA and USGS. Moving them out of their existing departments and combining them would establish the highly professional, independent capability that the Nation clearly needs. This agency could op-

erate as an independent Federal agency or as an entity with a Department of the Environment. If it is placed in the Department, it should operate independently of the regulatory programs.

The Bureau of Environmental Statistics called for in S. 171 would logically be combined with an Environmental Monitoring Agency. This Bureau, as defined in the bill, would be an important step forward in ensuring that Federal, state, and private sector decision-makers have available reliable data.

- The Environmental Protection Agency's existing laboratory structure, now comprised of 12 laboratories, should be consolidated to create a National Ecological Laboratory, a National Environmental Monitoring Systems Laboratory, a National Environmental Engineering Laboratory, and a National Health Effects Research Laboratory.

Substantial changes are needed in the EPA laboratory structure to accommodate the growing need for integrated environmental systems research and monitoring.

- A Federal Interagency Environmental Technologies Program should be established to promote and support the development of advanced technologies by Federal agencies, universities, industry, and nongovernmental organizations.

Such a program would provide support to Federal agencies and the private sector through grants, loans, and cooperative agreements to promote the development and diffusion of a wide range of advanced environmental technologies. EPA, or a Department of the Environment, should function as the lead Federal agency, providing funds to other agencies, industries, academic institutions, and nongovernmental institutions as appropriate to support development and diffusion.

EPA has experience in administering programs of this kind. In the 1970s, the Federal Interagency Energy/Environmental R&D Program successfully coordinated efforts with 16 Federal agencies. I was intimately familiar with that program, since I was its initial director beginning in 1974. I am convinced that a similar program focused on environmental technology development could also be successful. Legislation introduced in the last Congress by Representative Joseph P. Kennedy would establish such an interagency program.

These recommendations, taken together, would provide a major step forward in ensuring that public and private resources are optimally used to bring new control technologies to the market as well as to understand and deal with threats to the planet's biosphere.

Why Develop New Environmental Control Technologies?

Before we undertake new, expanded Federal programs to develop environmental control technologies, we should answer a strategic question: Why is America interested in developing environmental control technologies at this time? A number of answers have been offered:

- Further reduce environmental pollutants emitted by industrial and other sources here in America;
- Clean up thousands of sites here in America contaminated by industrial and governmental activities;
- Support growing efforts in pollution prevention;
- Reduce our balance of trade deficit through sale of such technologies to rapidly growing markets in Europe and Asia;
- Provide leadership and assistance to other nations whose pollution and practices threaten the global environment.

Each one of these answers suggests a distinctly different strategy. Some of these strategies are mutually supportive; others are clearly incompatible. Let me give you several examples.

First, developing more efficient, more cost-effective control technologies for sale to other advanced industrial nations may have little effect on reducing pollution here in the U.S. This is because our current technology-based regulations often "freeze" technology at a "tried-and-true" level, i.e., technologies which were introduced decades earlier. It is no secret that regulation can and often does destroy incentive for innovation. Other industrial countries, which rely on more cooperation between government and industry, could exploit our improved technologies but we couldn't without another costly and painful round of standard setting.

Second, control technologies for sale to developing nations will probably not be those which we term as "Best Available Technology." In most of the underdeveloped world where raw sewage is being dumped in rivers, even primary treatment is a critical step forward. Any type of exhaust or stack gas control is an improvement. Our foreign competitors learned this lesson many years ago so they sell "appropriate," often scaled-down technologies to developing countries where cost and cost-eff

fectiveness are much more important than removal efficiency or technological sophistication.

Third, technologies developed for end-of-pipe treatment generally have little to do with technologies developed for cleanup of contaminated sites, which in turn have little to do with technologies developed to prevent pollution. We must be realistic in our expectations and clear in our intent.

Pollution Prevention and Control Technology

One of the most encouraging developments of the past few years has been the emergence of pollution prevention or waste reduction. Former EPA Administrator William Reilly undertook an important initiative in stressing pollution prevention and encouraging many voluntary efforts in companies across the country. A growing number of companies are accepting the twin premises that a healthy economy can be good for the environment and a healthy environment can be good for the economy.

A number of leading companies have transformed the concept into a new business approach. Companies such as 3M, DuPont, Dow Chemical, Polaroid, and AT&T have adopted innovative pollution prevention programs and are demonstrating that these efforts can even improve their bottom line. In another report of the Carnegie Commission on Science, Technology, and Government, it was stated, "Waste reduction and energy efficiency are complementary and make good economic sense. Prevention of pollution can often pay for itself through reduced demand for inputs, reduction in waste disposal and liability costs, and other means. Indeed, achieving reductions in production of waste or the amount of energy required by waste-producing industrial processes can contribute significantly to the competitiveness of U.S. industries."²

In providing pollution prevention services to manufacturers across Northern Ohio, we at CAMP view the approach as extending the Continuous Improvement Process—one of the best ideas to come from Japan—to help our companies become more competitive. One thing we have learned from our companies is that pollution prevention has little to do with environmental control technology—as we have known it to date. In fact, the best measure of success in pollution prevention is that pollution is never produced in the first place.

Technology often plays a major role in avoiding pollution generation, but not as an after-the-fact, end-of-pipe treatment. New production processes may be used; existing processes may be retuned and closely monitored; feedstock substitutions may stop creation of byproducts. How will these promising new approaches which may significantly reduce pollution with a cost savings be factored into a major push for environment control technology? Given EPA's traditional reliance on end-of-pipe treatment technologies, the answer is not obvious to me.

To illustrate my concern, I should mention the impatience of some in the regulatory community with the pace of pollution prevention. Notwithstanding the fact that most manufacturers have suffered from the recession and slow growth of the past two years, some environmental officials seem to be frustrated that companies aren't moving faster to implement pollution prevention. At several national meetings, I have heard the sentiment "Since voluntary pollution prevention efforts aren't working fast enough, then let's write some regulations requiring companies to reduce their wastes" expressed several times. Regulations mandating pollution prevention will quickly kill most of the excellent voluntary programs that are accomplishing so much. This is not an ideological statement. Pollution prevention has to be driven by good economics and detailed knowledge of manufacturing processes, not by overly restrictive regulations written by laypersons.

Commercialization of Environmental Control Technologies

Finally, I would like to comment on the special challenges confronted in commercializing environmental control technology.

Usually technologies are invented and commercialized by entrepreneurs and enterprises with the intent of making profits. The risk takers who invest in the research, development, manufacturing, marketing, and sales of the new products expect a reasonable and timely return on their investments. One of the major factors in whether an individual, venture capital fund, or company decides to invest is the amount of uncertainty—market response, market size, actual cost of development, time required to complete development, poorer performance of the technology than anticipated, etc. High uncertainty is high risk. And higher risk demands higher returns or no deal.

Since it may not be obvious to some, it should be stated that most environmental control technologies are created in response to regulations. Since they are regulation-driven rather than market-driven, a new uncertainty variable enters the pic-

ture. This uncertainty takes many forms, but most often involves delays. Will lawsuits cause the regulations or standards to be delayed or sent back to the Agency for rework? Will the Congress, through subsequent amendments, change the compliance deadlines? Thus, while the requirement for a new control technology may represent a profit-making opportunity in the best of all situations, it also represents increased risk to the use of capital.

Further, in the regulatory world requiring end-of-pipe treatment, the vast majority of environmental control technologies add incremental costs to the users' costs of production. Consequently, there is little or no incentive on the part of the users to participate in the development of new technologies. When there is a cost advantage associated with a new control technology, a company must typically weigh that advantage against other risks.

In addition, there are four other barriers to the commercialization of environmental control technologies, as identified in a recent EPA paper: (1) regulations based on Best Available Technology (BAT) provide no incentive to do better than BAT; (2) compliance deadlines favor adoption of tried-and-true techniques; (3) financial double jeopardy is incurred if a company has to replace a failed innovative technology with a proven one; and (4) permit writers are loath to take risks in sanctioning untried technologies.³

To put things in perspective, technology itself is often the least important factor in a commercialization effort. The successful performance of a technology is a necessary but definitely insufficient condition. Typically management is considered the most important factor, followed by capital, marketing, and financial management, in no particular order.

What I have said is not meant to denigrate the progress that has been made in the past decade. Congress should be congratulated on passing the Federal Technology Transfer Act. U.S. industry's access to federally-developed technologies has improved immeasurably. EPA alone has now developed over 50 Cooperative Research and Development Agreements.

But regulatory uncertainty hovers like a black cloud over the commercialization of environmental technologies. That is why I feel that the bill introduced by Senator Mikulski in 1992 (S. 2632) does little to solve the problems. Creating a new agency to develop environmental technologies would do nothing to overcome regulatory uncertainty but rather it would exacerbate it by creating a bureaucratic gulf between EPA and the new agency. One promising aspect of Senator Mikulski's approach is the low-interest loan fund which would significantly supplement available sources of private capital, especially for early-stage development. But I think that such a loan fund could work much more effectively in a Department of the Environment where there is greater likelihood that regulatory policy could be balanced with technology development policy—all for the good of the environment.

Finally, I would like to endorse Title III of S. 171 which would establish a commission on improving environmental protection. First, such a commission would be very important in helping the new Department of the Environment set its goals and priorities for the next decade. The timing would be most propitious. Second, my experience with the Carnegie Commission task force forcefully reminded me of the growing need for the United States to have an integrated, holistic view of environmental quality.

REFERENCES

1. "Environmental Research and Development: Strengthening the Federal Infrastructure," Report of the Carnegie Commission on Science, Technology, and Government, New York, December 1992.
2. "E3: Organizing for Environment, Energy, and the Economy in the Executive Branch of the U.S. Government," Report of the Carnegie Commission on Science, Technology, and Government, New York, 1991.
3. "Envirotech 2000: The National Initiative for Environmental Technology Advancement for the 21st Century," Draft Report, Office of Research and Development, USEPA, December 17, 1992.

CENTER FOR MARINE CONSERVATION
WASHINGTON, DC
February 17, 1993

Senator John Glenn, *Chairman*
Committee on Governmental Affairs
Washington, DC 20510-6250

Dear Chairman Glenn:

As your committee considers legislation to raise the Environmental Protection Agency to a Cabinet department, I would like to express some concerns about the possible transfer of some or all of the statutory authority of the current Council on Environmental Quality (CEQ) to the EPA.

As you know, President Clinton has proposed to give environmental concerns better attention within the White House, in part by replacing CEQ with an Office of Environmental Policy. Although the environmental community generally supports this action, it is important that the necessary legislative changes be made in a manner that does not complicate EPA's job or do away with the legal authority, administrative process, and Federal court precedents associated with CEQ during the past two decades.

Some have suggested that CEQ's statutory authority under the National Environmental Policy Act (NEPA, P.L. 91-190) should be transferred to the EPA as part of the legislation to make it a Department of the Environment. Some enhancement of EPA's role under NEPA, such as in the areas of gathering, analyzing, and reporting information on conditions and trends in environmental quality, may be appropriate. Complete transfer, however, of CEQ's NEPA responsibilities from the Executive Office of the President (EOP) to a cabinet-level EPA would weaken NEPA and create serious problems for the head of EPA, for the reasons outlined below.

1. NEPA requires all Federal agencies to integrate environmental values into their actions "to the fullest extent possible"; this duty involves much more than environmental impact statements, which are prepared for relatively few activities. Title II of NEPA, along with the Environmental Quality Improvement Act of 1970 (P.L. 91-224) makes the Council and Office of Environmental Quality in the EOP responsible for overseeing existing Federal programs and activities for compliance with NEPA; for coordinating environmental programs throughout the government; and for developing and recommending to the President new national policies and programs to improve environmental quality.

These responsibilities should not be delegated to EPA, because they cut across the entire Federal Government, including other Cabinet departments and independent agencies; because they require full participation in the development of the President's annual budget proposals to Congress (a function limited to EOP agencies); and because they involve review and clearance of legislation and regulations affecting many agencies, which requires close coordination within the EOP.

2. Delegating full NEPA authority to EPA would put one Cabinet officer in the very difficult position of attempting to direct another Cabinet officer. The NEPA Regulations (40 CFR 1500-1508) issued by CEQ in 1978 are binding on all Federal departments and agencies, and include a formal referral process whereby CEQ reviews and mediates interagency environmental disputes, such as have occurred between EPA and the Corps of Engineers. The Clean Air Act (Section 309) also provides for such referrals. It is inappropriate for EPA to be given the authority to apply the NEPA Regulations to other agencies, or to mediate its own disputes with those agencies, particularly since EPA has opposed applying NEPA's EIS requirements to nearly all of its own programs and actions.

3. EPA has expertise and credibility in many areas, such as pollution control and risk assessment, but not in other areas, such as the management of natural resources, parks, and public lands. Whereas CEQ has been able to draw on environmental expertise from many sources, EPA would either have to hire its own NEPA staff (while under orders to reduce its staff overall) or try to borrow such expertise from other Federal departments and agencies, who will be protecting their "turf." This will create conflicts and weaken EPA's own credibility.

4. In its early days, CEQ helped draft the legislation to create EPA, and has played an important role in drafting or reviewing subsequent laws and policies now carried out by EPA. From its position in the Executive Office, CEQ has provided support for EPA during the budget process, through the development of Presidential policies, and via interagency dispute resolution. A Cabinet-level EPA will continue to benefit from having an EOP office with the authority NEPA now provides to help develop, coordinate, and oversee environmental policy and to serve the President in a non-departmental advisory role.

In conclusion I would urge you to proceed with the legislation needed to elevate EPA to departmental status, but not to create difficult problems in environmental law and administrative procedures by attempting to transfer functions to EPA that are better left with CEQ or its successor in the White House.

Sincerely,

ROGER E. McMANUS

PREPARED STATEMENT OF LAURIE A. WESTLEY, NATIONAL SCHOOL BOARDS
ASSOCIATION

The National School Boards Association (NSBA) is the Nationwide advocacy organization for public school governance, representing 97,000 elected and appointed local school board members. The vast majority of school board members are not paid for their service. Rather, they give their time because they care about the education of their own children and the children in their community. The safety of those children is a very real concern for these community leaders. They do not want anything to harm the health of the children they work so hard to serve.

NSBA wishes to use this hearing on whether EPA should become a cabinet-level agency to raise concerns about the agency's risk assessment practices. This testimony will begin where the educational curve for schools and environmental issues began—with asbestos. But it will begin with the postscript.

In 1990, then-EPA Administrator William Reilly came close to admitting that his organization was responsible for a significant environmental error. In a speech before the American Enterprise Institute, Mr. Reilly admitted that much of EPA's work on asbestos, at best, was riddled with errors and had proved unnecessarily expensive.

This saga began in 1982 when EPA accepted the claims of professional environmentalists "that there can be no safe level of exposure to a carcinogen" or in the case of asbestos—"that one fiber can kill." There was not an accurate assessment of the risks. The agency accepted a scientifically discredited four-year-old study predicting asbestos, as a low level carcinogen, would cause as many as 40,000 "excess deaths" per year. The study was based on the experience of World War II shipyard workers who worked with extremely high levels of asbestos, and those results were extrapolated down to exposure in the general public.

The EPA used this study despite evidence that the actual asbestos deaths of shipyard workers were no more than 520 at the highest point—and was falling sharply as they died of natural causes. EPA also ignored its own scientific review of the study. EPA's own scientific panel denounced the study as "unconvincing," "greatly overestimated," "scientifically unappealing," and "absurd."

Further, scientific studies now show us that there are two kinds of asbestos and the kind in schools and most public buildings is significantly less dangerous than the other variety.

The postscript to this strange tale is that asbestos removal is estimated to have cost this country \$150 to \$200 billion. Schools have spent the lion's share of this figure. And every one of those dollars was taken from the resources needed to create the world-class schools this country says it wants.

The reason this is important is by way of parable. We must determine the lessons we should have learned from the asbestos experience. If we do not apply those lessons, we will be doomed to repeat the same errors.

And lest you think this is a hypothetical possibility, the Congress has bills pending requiring mandatory school testing of lead, radon, and indoor air quality.

To summarize, the formulation of public policy on the asbestos issue was ahead of the scientific evidence to establish an accurate risk assessment; the result was that millions of scarce educational dollars were wasted.

Schools cannot afford to abate questionable environmental hazards, abate them in an unnecessary way, or abate them down to a level that is beyond a meaningful risk assessment.

Here we are at the beginning of the 103d Congress, with the expectation that well-meaning members of Congress will introduce bills to address environmental hazards for which there is insufficient scientific basis and insufficient financial resources. Last year NSBA wrote testimony opposing a radon bill because the scientific understanding of low-dose radon is inadequate, at this point, to support mandatory testing paid for by local taxpayers.

The similarities are striking as to how the asbestos issue began, when compared to the radon issue. The basis for understanding the effects of radon is the extrapolation of data from four studies of uranium miners in the 1950s. The work using these studies as a basis is imprecise at articulating the degree to which the radon is a contributing factor in the contraction of lung cancer in the general population.

Further, this subsequent work has found it difficult to screen out the additional harmful agents on the miners' lungs—the length and concentration of time they were in the mine, the lack of effective ventilation, the percentage of heavy smokers, the additional dust and mineral irritants—all of which contribute to lung cancer and are not substantially prevalent in the average American home or school.

Moreover, there are substantial doubts about the linear extrapolation method used in calculating environmental health risks to the general public from the miners' studies. The linear extrapolation method is widely criticized by scientists; that is, the process of inferring from occupational studies of uranium miners exposed to radon at extremely high levels, the adverse health effects on the general population exposed to low levels of radon in homes or schools.

The lack of certainty about the presence of a risk and the point at which that risk should be actionable are equally vague when viewing the totality of the international literature. There are dozens of scientific studies of the health risks of radon in the United States, Canada and throughout Europe that are no more conclusive than the miners' studies. Further, the level of radon at which concern is voiced is substantially higher in other countries—levels of 12 to 20 picoCuries per liter (pCi/liter) in Canada and Europe. Whereas, the United States has just suggested reducing "the action level" 50 percent: from four to two pCi/liter.

In addition, there is scientific disagreement over the threat posed by radon to children. EPA has contended, based on a controversial statistical model, that children are three times as susceptible as adults. But another study—of miners in China—shows that exposure under the age of 13 may build something akin to an immunity response. A current thought is that there is no additional risk due to early exposure. Consequently, the age factor remains an uncertain factor—possibly contributing to a higher threat or more possibly reducing or not affecting the serious threat of lung cancer.

A literature review contracted by the EPA and the National Cancer Institute, reviewed 15 studies on radon and found that the studies were contradictory. Seven studies found "statistically significant positive associations between estimated exposure to indoor radon and lung cancer, six found no association and two found significant negative associations."

Former EPA Administrator William Reilly's March 1992 statement to the House Committee on Science, Space and Technology was a broad indictment of EPA's lack of scientific basis for its policy pronouncements. This statement was based on EPA's Science Advisory Board's recent report to upgrade the agency's scientific capability and credibility. NSBA commended Administrator Reilly for his candid assessment of the agency's need for an uncontrovertible base in scientific research before millions of taxpayer dollars are spent to solve an alleged environmental problem.

Developing a firm scientific basis for knowing that we have an environmental hazard and the degree to which it should be abated are critical to EPA's credibility and to ensure that education funding is spent wisely—either to protect the health of children or to educate them. I believe that public policy was made ahead of the scientific evidence on asbestos. The result was that millions of scarce educational dollars were wasted. I believe that schools cannot afford to abate questionable environmental hazards, abate them in an unnecessary way or abate them down to a level that exceeds the scientific evidence on risk assessment.

The issue of accurate risk assessment should be addressed before EPA is elevated to a cabinet-level agency.

PREPARED STATEMENT OF RICHARD L. HEMBRA

Mr. Chairman and Members of the Committee:

We appreciate the opportunity to present our views on the creation of a Department of the Environment and on Senate Bill 171.

We are pleased to see that attention is still focused on creating a Department of the Environment and that you have again introduced legislation to this end. As we said in testifying on predecessors to S. 171,¹ we believe that conferring Cabinet status on the Environmental Protection Agency (EPA) would not only enhance the status of environmental protection issues on the Nation's agenda but also enable the Nation to respond more effectively to the complex environmental challenges it faces.

In summary, we continue to support the creation of a Cabinet Department of the Environment for the same reasons that we have cited in the past. These reasons include:

¹ *Creation of a Department of Environmental Protection* (GAO/TRCED-89-52, June 21, 1989) and *Creation of a Department of the Environment* GAO/T-RCED-90-26, Feb. 8, 1990).

- the growing importance of EPA and of environmental issues,
- the interrelationship of environmental protection issues and other issues represented by Cabinet departments, and
- the ability of the proposed elevation to Cabinet status to meet other recognized criteria for elevation, such as improving the agency's oversight and accountability.

We would like in this testimony to review these reasons as well as organizational and management issues that, in our view, have an important bearing on the legislation before this Committee.

Growing Importance of EPA and of Environmental Issues

It is important to understand how different the EPA of 1993 is from the EPA of 1970. Today, the agency administers a dozen or so major environmental statutes. Most of these statutes had not yet been enacted when EPA was created. Even those that were on the books, such as the Clean Water Act, were completely revamped in the 1970s. From first-year expenditures of \$384 million, EPA's annual outlays have risen to almost \$6 billion. As a percentage of total Federal outlays, EPA's share has more than doubled since 1970. Furthermore, EPA spends about as much each year as the Department of the Interior—and more than the Departments of State and Commerce.

Of greater significance than the size of Federal outlays for environmental protection, however, is the effect of EPA's programs on our national economy. Environmental control measures have cost the Nation approximately \$1 trillion thus far. We now spend about \$115 billion a year, or about 2 percent of our gross domestic product (GDP), on controlling and regulating pollution. In fact, a whole new sector of the economy has grown around pollution control. In the early 1970s, Federal programs controlled the most visible types of pollutants—what comes out of smokestacks or goes into sewers. Since then, the Federal Government has assumed responsibility for regulating less visible, but more pervasive, sources of pollution: toxic chemicals, hazardous waste disposal, and chemically contaminated lands and water.

In the future, the Federal role in environmental protection is likely to grow larger, especially as environmental problems become increasingly international. Although we have reduced air and water pollution, we have not solved these problems. The cleanup of hazardous waste sites is clearly going to continue well into the next century, as are efforts to reregister pesticides. And even as we move to try to solve old problems, we discover new ones, like global warming and indoor air pollution. Moreover, resolving some of these problems—like global warming and the depletion of the stratospheric ozone layer—will require unprecedented international cooperation. To sum up, the number, scope, and persistence of environmental problems argue strongly in favor of representing environmental issues in the Cabinet.

Interrelationship of Environmental Protection and of Issues Represented in the Cabinet

As our awareness of environmental problems has increased and EPA's role has expanded, environmental policy has increasingly shaped other domestic and foreign policies. The 1990 Clean Air Act Amendments, for example, which called for switching to cleaner fuels and cleaner coal-burning technologies, are directly linked to the Nation's energy policies. The United States' participation in the international agreement to phase out production of chloroflourcarbons (CFCs) illustrates the integration of our environmental policies with our trade and foreign policies. As we begin to address global climate change, we will have to examine interrelationships among policies in many areas, including energy, agriculture, overseas assistance, foreign trade, and national security, among others.

Because EPA is the Federal organization responsible for identifying and representing environmental interests before the rest of the government, EPA interacts regularly with the Departments of Agriculture, Defense, Energy, Interior, State, Transportation, and so on. Elevating EPA to Cabinet status would ensure that the head of the agency is able to deal as an equal with his or her counterparts both within the Federal Government and the international community. Compared with many other Federal departments' interests and responsibilities, EPA's are equally wide-ranging.

Moreover, numerous GAO reviews have demonstrated that other Federal agencies do not always provide the support and cooperation necessary to further environmental policy goals. Instead, roadblocks are often created by jurisdictional conflicts, organizational structures, and cultures that are not conducive to cooperation with EPA or that place a low priority on environmental protection. In some cases, the effect of these roadblocks has been serious. We see, for example, that years of ignoring environmental consequences at Defense and Energy Department facilities have jeopardized the health of neighboring communities and are likely to cost the Feder-

al Government close to \$200 billion to correct. It is therefore important that the United States have an organization at the Cabinet level that is designed to ensure, as far as possible, that agency managers will consider and actively support national environmental policy goals as they make decisions about programs for which they are responsible.

Ability to Satisfy Other Assessment Criteria

In recent years, when other agencies have been proposed for Cabinet status, concerns have been expressed that increasing the number of Cabinet members reporting to the President would make the Cabinet more cumbersome and useful. While these concerns are not without merit, we believe that they are overshadowed by the significant impact of environmental decisions on our economy, the importance of environmental issues, and the interrelationship of environmental issues and other national issues—most of which are represented by agencies with Cabinet status.

Furthermore, the proposal to elevate EPA to Cabinet status meets many of the criteria for elevation developed by the National Academy of Public Administration (NAPA) during consideration of a proposal to create a Department of Veterans Affairs. These criteria include improving program visibility to achieve a broad national goal, facilitating the achievement of cross-cutting national policy goals, and improving an agency's oversight and accountability. We believe that establishing a Cabinet department of the environment would support the broad national goal of protecting our environment, and its structure would allow consolidation of functions now located in other executive branch agencies.

Although we have not analyzed the cost associated with implementing the provisions of S. 171, the Congressional Budget Office had calculated that the costs of converting EPA to a department would be relatively small. The bill now under consideration contains additional features that could add to the conversion's costs—specifically, the creation of a Bureau of Environmental Statistics and a Commission on Improving Environmental Protection. However, the creation of such entities could help to resolve some long-standing concerns, discussed below, and the associated costs could, in the long run, more than pay for themselves.

Organization and Management Issues

From our reviews of individual programs at EPA as well as a 1988 general management review,² we conclude that several problems would remain to be addressed even if EPA were elevated to Cabinet status. Among other things, the agency would need better means for measuring the effectiveness of its programs, better financial and other management information systems, and better internal controls, as well as an organizational structure that could better reflect what are considered to be the most important environmental problems.

We are therefore pleased to see that S. 171 would establish a Bureau of Environmental Statistics within the Department of the Environment, as well as a commission to study organizational and jurisdictional issues. Both throughout the agency and within specific programs, as we have stated, EPA lacks both performance measures and information for assessing the effectiveness of its programs in improving or protecting environmental quality. We commend you Mr. Chairman and Mr. Roth, for taking a strong position on the need for performance measurements throughout the Federal Government and for introducing legislation (S. 20) that would create a pilot program. EPA could benefit from participating in such a program. Although environmental programs are designed to clean up or prevent unacceptable levels of pollution, EPA has not had the information necessary to judge the success of its programs. While the agency has developed some measures of environmental outcomes—meeting national air quality standards, for example—EPA has generally relied on activity-based indicators, such as numbers of permits issued or enforcement actions taken, to track its progress. Because EPA has traditionally considered itself primarily a regulatory agency, it has focused its attention and resources almost exclusively on setting standards and issuing permits rather than on developing the information necessary to measure results.

EPA has made some effort to refocus its management information systems on results and has begun to develop environmental indicators to use in this system, but considerable work remains to be done. A central unit for collecting, analyzing and disseminating environmental data, such as a Bureau of Environmental Statistics, could therefore be very helpful in this effort. We would add that developing a reliable set of environmental indicators, which would allow EPA to judge the Nation's

² *Environmental Protection Agency: Protecting Human Health and the Environment Through Improved Management* (GAO/RCED-88-101, Aug. 16, 1988).

progress in meeting environmental goals, should be one of the new Bureau's top priorities.

We also, in our general management review of EPA and in our analysis of proposals to elevate EPA to Cabinet status, raised questions about an appropriate organizational structure for EPA and about the need for a unified environmental statute that might eliminate some of the conflicts and inconsistencies among many environmental statutes for which EPA is responsible. Because EPA was created under an executive reorganization plan, it has no formal, overarching legislative mission. Instead, its statutory responsibilities are set forth in a dozen or so separate pieces of legislation that tend to assign pollution control responsibilities according to environmental medium (such as water or air) or category of pollutant. These numerous legislative mandates have led to the creation of individual program offices that have tended to focus solely on reducing pollution within the particular environmental medium for which each office has responsibility than on reducing overall emissions. If, however, EPA's statutory responsibilities were consolidated into a single unified environmental statute, the agency might find it easier to set priorities and allocate resources in response to its evolving understanding of environmental issues. A commission to study this possibility could provide an important public service by finding answers to these questions.

We also believe it would be worthwhile for a study commission to consider the most appropriate and effective organization for the department. For example, in an examination of alternative enforcement organizations for EPA,³ we argued that the choice of an organizational structure for enforcement at EPA ought not to be made in isolation but in conjunction with an examination of the future organizational structure of the agency as whole. We therefore continue to support the creation of a study commission that the Congress can call upon for ideas about how to organize the whole department, including the enforcement functions. The commission might, for example, consider whether to reorganize the department entirely by function, so that instead of having program offices dedicated to environmental media, the department might have a single office of regulatory development, an office of enforcement, an office of science and research, and so Alternatively, the department might be organized by pollution sectors—industry, transportation, and municipalities, for example. The commission could also consider the roles and responsibilities of headquarters and regional offices.

Conclusion

In summary, we believe that elevating EPA to Cabinet status would affirm the prominence and permanence of the Federal role in environmental protection. With the additions proposed under S. 171, a Department of the Environment could ultimately provide the United States with a far more effective organization for addressing the difficult environmental agenda awaiting us in the years ahead.

PREPARED STATEMENT OF AMOCO CORPORATION

On behalf of the Amoco Corporation and its operating companies, we appreciate the opportunity to provide comment on the issues surrounding the elevation of the U.S. Environmental Protection Agency (EPA) to Cabinet level, and specifically on S. 171, the "Department of the Environment Act of 1993." Amoco has recently completed a joint study with the EPA to evaluate pollution prevention opportunities at Amoco's Yorktown, Virginia refinery, which we believe provides insights for legislative and regulatory policy affecting environmental management and environmental innovation. Our statement highlights the findings of this study as it relates to specific concerns of the Congress and of the EPA as it takes up the EPA Cabinet elevation.

Amoco is aware of the continuing dialogue over whether EPA Cabinet legislation should be pursued simply as a "clean" piece of legislation (i.e., elevate EPA to Cabinet with no other legislative provisions addressed) or whether Congress should use this legislative opportunity to pursue further Agency reforms including those to promote: good data generation; sound use of risk assessment and other risk management tools; procedural reforms; use of "green" environmental technologies; pollution prevention; and development of a national environmental strategy. Amoco sup-

³ *Environmental Enforcement: Alternative Enforcement Organizations for EPA* (GAO/RCED-92-107, Apr. 14, 1992).

ports each of these environmental goals and encourages national dialogue and Congressional review, be it within the context of EPA Cabinet elevation or within other legislative or regulatory forums. We look forward to working with Congress and the EPA or Department of the Environment in such endeavors to promote these laudable goals.

Amoco offers its insights and recommendations from the perspective of an entity that is subject to the full panoply of environmental and other regulatory requirements. We are fully supportive of the need to stimulate innovative environmental solutions and to further better utilization of good science and good data. As such, we offer the following specific comments regarding S.171:

I. EPA or the Department of the Environment Should Foster The Development of Innovative Technologies and Solutions to Environmental Problems

If EPA is elevated to Cabinet level, the responsibilities of the Assistant Secretaries should specifically include Environmental Innovation, in addition to those already listed in S.171 and possibly in conjunction with Pollution Prevention, to explicitly emphasize the need for the EPA to foster innovative policy approaches combined with innovative technology to solve today's complex environmental challenges.

As a means to further stimulate innovative thinking and foster an innovative approach to environmental management, the annual report specified as part of a new Bureau of Environmental Statistics should include information on successes in applied innovation.

II. A Department of the Environment Should Ensure the Collection of Useful Data for Environmental Risk Prioritization Efforts and Responsible Investment

The availability and use of good scientific data is critical to the successful achievement of the Department's goals of protecting human health and the environment. With limited resources, both within the Department and in the private sector, the Department must formulate a national environmental strategy that identifies and addresses the highest risks first, and maximizes the environmental benefits obtained for the resources invested.

A. Establishment of the Bureau of Environmental Statistics

If appropriately structured and with adequate controls, the establishment of a Bureau of Environmental Statistics could be a vital ingredient in the development of good scientific data and sound science. A central clearinghouse of environmental information could open up the opportunity to leverage resources with the private sector. If a Bureau is to be established, the following objectives should be considered in addition to those already in S.171:

- 1) In addition to reporting on the amounts and effects of pollutants on the environment, the Department should include information on the improvements to environmental quality resulting from the multitude of environmental programs (e.g. from annual TRI reports or voluntary reduction program reports, such as 33/50).

- 2) The Department should perform external audits and provide detailed reports on major spending programs which it oversees as a public trustee, such as Superfund.

- 3) The Department should evaluate the quantity and quality of the data currently being collected, to ensure that the right data is being collected to ascertain both absolute and relative risks of reported pollutants, and to ensure that redundant or unnecessary data is not being collected. The Department should evaluate other options for data collection management, such as data collection by industry sector, and data collection of compound groups instead of individual speciations.

- 4) Congress should consider establishing a National Environmental Sciences Institute to provide a focused, world class, center of excellence for environmental research, in the same manner as the National Institutes of Health provide medical and public health research.

- 5) Regarding the implementation of all government-wide and Department information policies and standards, the Department should evaluate using 4-digit SIC codes for each Federal Register publication to facilitate use of computer technology to deliver, search, and categorize regulations and other information.

- 6) In order to ensure the accuracy and completeness of records contained with the Department information systems, the Department should evaluate what systems and guidelines would be required to allow regulated facilities to submit required data electronically.

B. EPA or the Department of the Environment Should Develop a Sound Basis for Prioritizing Environmental Risks

Since the goal of the EPA or Department is to protect human health and the environment with the resources available, the ranking of relative risk is an important technique for ensuring environmental protection.

1) To ensure that the greatest risks are identified and that the environmental laws are applied in such manner as to accomplish the intended results of the laws, the EPA or Department should establish an expert advisory committee whose purpose is to provide advice concerning the relative ranking of risks, identify the need for new laws, and set priorities for existing laws, within the constraints of statutory authority. The committee should identify different alternative options for reducing risks, as well as the costs to regulatory agencies and the private sector.

This expert advisory committee should be independent of the Science Advisory Board, and include representation from industry, public interest groups and the states. The committee should report on their findings at least annually to Congress.

2) The EPA or Department should also develop guidelines to ensure consistency and technical quality in risk assessments by setting minimum standards for different risk assessment approaches, depending on the magnitude of the environmental problem, level of scientific understanding, and the available data. In addition, the EPA or Department must resolve and reconcile the different risk assessment approaches used by various Federal agencies, such as EPA, FDA, CDC, etc.

III. The EPA or Department of the Environment Should Explore Opportunities to Improve Its Regulatory Program Effectiveness In The Name of Pollution Prevention and Environmental Innovation

A. If Established, the Commission on Improving the Environment Should Ensure A Review of Current Regulatory and Statutory Obstacles That Hinder Pollution Prevention and Environmental Innovation

The joint Amoco/EPA study at the Yorktown refinery identified certain obstacles to achieving pollution prevention goals. The current system encourages short-term fixes at the expense of more effective, long-term solutions. In addition, incomplete or inaccurate data regarding emissions often diverts energies to problems of less significance relative to others.

The EPA or Department of the Environment could verify the benefit of improved environmental protection by investigating specific issues such as but not limited to the following:

1) Regulatory compliance deadlines—determine the extent that different regulatory deadlines aimed at the same source and/or constituents of concern impede pollution prevention and multi-media environmental management approaches (e.g., emissions from waste systems under the Benzene Waste NESHAP and emissions from waste management facilities under RCRA Phase II Air Emissions).

2) Different environmental performance goals and measures—identify the barriers or obstacles in regulations (e.g., prescriptive regulation of technology to be applied) that hinder the use of innovative environmental management methods and techniques, and how different compliance measures (e.g., different requirements to demonstrate compliance) hinder development of innovative pollution prevention technologies.

3) Role of risk—identify the advantages, limitations and obstacles to the use of risk assessments and risk management techniques in developing and prioritizing both EPA (or Department) and facility risk reduction goals.

B. With or Without a Legislative Mandate, the EPA or Department of the Environment Should Be Provided Legislative Authority to Allow Multi-Media Alternative Regulatory Compliance Protocols to Promote Environmental Innovation. Pollution Prevention. and Cost-Effective Environmental Compliance

The Yorktown study also found that better environmental benefits can be achieved at lower cost. Each facility is different, with its own operations, equipment, and number of emission sources. At the Yorktown facility, the study found that over 95% of the mandatory emission reductions could be achieved at 20-25% of the cost. Thus, the study recommended that the EPA evaluate options for setting a goal or target for reducing emissions, then allow the facility the flexibility to develop a strategy to meet the target.

The current system discourages innovative solutions to complex environmental problems. Environmental investments have focused on single-issue regulatory requirements as they were developed. There has been little coordinated management of multiple regulatory requirements because the regulations themselves do not recognize or allow for this, and there is little sound data to support the incentives of this approach.

Many other experts in the environmental policy arena also support the use of alternative regulatory compliance mechanisms to encourage greater environmental benefits that the current systems allows.

In *A New Generation of Environmental Leadership*, the World Resources Institute has proposed that "Congress should, on an experimental basis, allow qualifying companies to opt into an alternative regulatory track. There, within careful confines,

novel regulatory approaches could be tested and companies could come forward with their own innovative approaches, as long as the end result is just as good or better for the environment."

In *The Greening of America's Taxes: Pollution Charges and Environmental Protection*, Harvard University Assistant Professor Robert Stavins concludes that "Command and control rules can hamper technological innovation by locking firms into outdated pollution control equipment. They ignore important differences among individuals, firms, and regions."

With or without a legislative mandate, the EPA or Department of the Environment should pursue further demonstration projects where the following can be evaluated:

(1) the extent that regulatory incentives, such as the modification of the requirements imposed by terms of all or part of any permit, can be more effective in preventing pollution than current regulations allow. For example, investigate instances where control of all sources of emissions at a facility could be more cost-effective than mere compliance with facility permit requirements.

(2) that greater net protection of human health and the environment can be obtained by preventing pollution rather than by controlling pollution after it is generated, i.e., focus resources on pollution prevention efforts rather than on prescriptive pollution control.

(3) whether a multi-media approach to facility permitting will be more effective in reducing the overall risk from a facility, and whether a multi-media permit approach will be more likely to ensure that environmental risks are not shifted from one medium to another.

These demonstration projects may require an amendment to the Pollution Prevention Act. However, Amoco would be willing to work with Congress and the EPA or Department of the Environment to pursue the appropriate legal mechanisms.

IV. Conclusion

Amoco appreciates the opportunity to provide comments on S. 171. As demonstrated by Amoco's involvement with the EPA in the cooperative study at the Yorktown refinery, Amoco is committed to protecting human health and the environment, and continually strives to ensure that our investments benefit both our environment and our economy.

March 2, 1993

AMOCO/USEPA POLLUTION PREVENTION PROJECT

EXECUTIVE SUMMARY

In late 1989, Amoco Corporation and the United States Environmental Protection Agency began a voluntary, joint project to study pollution prevention opportunities at an industrial facility. The Amoco/EPA Workgroup, composed of EPA, Amoco and Commonwealth of Virginia staff, agreed to use Amoco Oil Company's refinery at Yorktown, Virginia, to conduct a multi-media assessment of releases to the environment, then to develop and evaluate options to reduce these releases. The Workgroup identified five tasks for this study:

1. Inventory refinery releases to the environment to define their chemical type, quantity, source, and medium of release.
2. Develop options to reduce selected releases identified.
3. Rank and prioritize the options based on a variety of criteria and perspectives.
4. Identify and evaluate factors such as technical, legislative, regulatory, institutional, permitting, and economic, that impede or encourage pollution prevention.
5. Enhance participants' knowledge of refinery and regulatory systems.

LESSONS AND RESULTS

Refinery Release Inventory

A. Existing estimates of environmental releases were not adequate for making a chemical-specific, multi-media, facility-wide assessment of the Refinery.

B. Pollutant generation and internal transfers differ substantially from pollutant releases to the environment.

C. The TRI database does not adequately characterize releases from this Refinery. Better environmental data can improve environmental management decisions.

D. Site specific features, determined during the facility-wide assessment affect releases and release management options.

Reducing Releases

A. A workshop approach, drawing on a diverse group representing government, industry, academic, environmental, and public interests, developed a wide range of release reduction options in a multi-media context more quickly than either EPA or industry alone would do.

B. Release management frequently involves the transfer or conversion of pollutants from one form or medium to another.

C. Source reduction is not necessarily practical for all release management options, despite its cost effectiveness.

D. In this Refinery, few release reductions pay for themselves.

Choosing Alternatives

A. Ranking the options showed that better environmental results can be obtained more cost effectively. At this facility, about 90 percent of the emission reductions required by regulatory and statutory programs can be achieved for 20-25 percent of their current cost.

B. All participants agreed on which options were the most effective and which were least, regardless of their ranking criteria or institutional viewpoints.

Obstacles and Incentives

A. EPA may not have the statutory flexibility to simply set an emissions reduction "target" without prescribing how this target should or could be met. If a target involves releases in multiple media, current administrative procedures discourage a coordinated approach, including the analysis of risks, benefits, and costs of managing residual pollutants in different media.

B. Legislative and regulatory programs do not provide implementation schedules compatible with design, engineering, and construction timeframes. Consequently, short-term "fixes" are used at the expense of more effective solutions.

C. Congress, EPA, and much of industry have developed a mind-set and comfort level with command-and-control, end-of-pipe treatment approaches based on twenty years of experience. Many of today's problems could benefit from a different approach.

D. Accounting systems in industry and government do not track environmental costs well, nor measure environmental health. Responsibility for pollutant generation and accountability for environmental protection are difficult to monitor.

RECOMMENDATIONS

1. Explore opportunities to produce better environmental results more cost-effectively.

2. Improve environmental release data collection, analysis, and management.

3. Provide incentives for conducting facility-wide assessments, and developing multi-media release reduction strategies. Such strategies must consider the multi-media consequences of environmental management decisions.

4. Encourage additional public/private partnerships on environmental management.

5. EPA should conduct research on the potential health and ecological effects of VOCs and reformulated gasoline.

PROJECT ORGANIZATION, STAFFING, AND BUDGET

Workgroup: Monthly Workgroup meetings provided Project oversight, a forum for presentations on different Project components, and an opportunity for informal discussion of different viewpoints about environmental management. Although attendance varied, each meeting included representatives from various EPA offices, the Commonwealth of Virginia and Amoco.

Peer Review: At the Workgroup's request, EPA arranged for Resources for the Future to assemble a group of outside scientific and technical experts. This Peer Review Group provided evaluation and advice on the Project workplan, sampling, analysis results, and conclusions. Members of this group were paid a small honoraria for their participation by EPA.

Workshop: A special Workshop, held during March 24-27, 1991 in Williamsburg, Virginia, reviewed sampling data and identified reduction options and ranking criteria. More than 120 people from diverse backgrounds—EPA, Amoco, Virginia, academia and public interest groups—attended the Workshop.

Participants: More than 200 people, 35 organizations, and many disciplines were involved in this Project. This reflected the Project's view that solving difficult environmental problems must draw on many of "society's "partners."

Cost: Total cost for this Project was approximately \$2.3 million. Amoco Oil Company provided 70 percent of the funding and EPA the remainder.

PREPARED STATEMENT OF KENNETH OLDEN, PH.D., NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

I am pleased to submit testimony for the record on the mission and activities of the National Institute of Environmental Health Sciences.

The National Institute of Environmental Health Sciences (NIEHS), a biomedical research institute within the National Institutes of Health, makes a critical and unique contribution to a broad Federal effort to protect human health from the spectrum of diseases and disabilities associated with chemical, biological, and physical agents in the environment.

The NIEHS research program consists of human studies (clinical research, clinical trials, and epidemiologic studies), fundamental biological research, and toxicologic research conducted in intramural and private laboratories, in rural and urban communities, and in research hospitals. The work is carried out by 600 university-based investigators throughout the United States and by 400 staff scientists in the NIEHS headquarters in Research Triangle Park, North Carolina.

Human health is determined by complex interactions between individual genetic susceptibility and the environment. Both these components change over the course of one's lifetime. One important component of the basic biomedical research conducted and supported by NIEHS is entirely unique in the Federal Government. NIEHS maintains the only concerted research effort that addresses human susceptibility to various environmental exposures at the molecular, cellular, and intercellular levels. NIEHS scientists are applying the explosion in knowledge of human biology and the latest scientific technologies and tools of molecular biology to the identification of specific receptors and genetic loci that are adversely affected by environmental factors and lead to a host of chronic diseases and disabilities. This research should lead to critically needed diagnostic and therapeutic approaches to environmental illness and to the development of molecular and other preventive interventions.

Unlike the research conducted or supported by other Federal public health or environmental protection agencies that must be done in direct support of their missions, the placement of NIEHS in the National Institutes of Health has allowed highest priority to be given to research proposals that score highest in peer-review evaluations of the proposals' excellence and innovation whether the studies are applied or basic in nature. In addition, NIEHS is able to provide and sustain support for very high-risk research proposals that may not have a recognizable potential to yield immediate new data.

NIEHS also has an important collaborative role within the Public Health Service and with the many other Federal agencies with environmental research activities. The totality of the research conducted or supported by NIEHS research remains relevant and vitally important to the resolution of the complex public health and environmental policy and protection issues that face Federal, state, and local policy makers and program officials. Historically, NIEHS research has provided the health sciences data base for such high visibility programs as the prevention of lead poisoning in children; establishment of levels of concern for priority air pollutants; and the prevention of certain environmentally related reproductive disabilities and human cancers.

Today, the NIEHS has almost unlimited potential to combine the many scientific disciplines involved in modern environmental health sciences to address such issues as:

- Combining molecular biology and epidemiology to conduct molecular epidemiologic studies aimed at improving the accuracy and predictive capacity of community-based environmental epidemiology to establish causal relationships between specific environmental exposures and human diseases.
- Identifying, reducing, and preventing the contribution of environmental factors to hormonally related cancers such as those of the breast, uterus, and prostate.
- Characterizing the relationship between bone metabolism, exposure and uptake of lead and other metals, exposure to DES, and the development of osteoporosis.
- Developing scientifically sound strategies to predict toxic effects of classes of manmade chemical and physical agents before they are introduced into the environ-

ment to prevent unnecessary morbidity and mortality and the financial burden of regulation and litigation.

- Improving the science base for risk assessments by conducting studies of the biologic mechanisms of toxicity and adding other important health end-points to modern toxicologic studies.

- Providing a scientific approach to addressing questions of environmental equity and environmental justice by identifying the critical additional environmental contributions to the burden of illness and disability in a Nation where as many as one child in five lives in poverty.

- Fulfilling a need for health professionals (physicians, nurses and other allied health workers) and research scientists to pursue careers in environmental and occupational medicine, health and health sciences.

We would be pleased to provide additional information.

PREPARED STATEMENT OF CHEMICAL MANUFACTURERS ASSOCIATION

The Chemical Manufacturers Association (CMA) offers the following comments regarding the Department of the Environmental Act of 1993.

CMA is a nonprofit trade association whose members represent more than 90 percent of the productive capacity for basic industrial chemicals in the United States.

CMA supports the idea of elevation of the Environmental Protection Agency (EPA) to a cabinet level department as proposed in S. 171. Elevation of EPA to cabinet rank will demonstrate the commitment of this country to protect the environment, insure that our environmental policies are coordinated with other Federal policies, and provide the secretary ministerial rank for international negotiations and meetings.

While some may see creation of a cabinet rank agency as simply a symbol, we believe it offers a number of opportunities to improve the commitment to protect the environment. Specifically we hope the department will take a leadership role in insuring that sound, scientifically defensible steps are taken to protect the environment. Too often in the past this country has made environmental decisions based on emotion. We must insure that all of our decisions are based on peer reviewed data and reasonable predictions of the effects of an action as well as the impact of taking no action. The department must set priorities based upon overall risk to human health and the environment and not be swayed by media attention to current issues that are not of overall importance to the environment.

The new department should assist the public in making informed decisions by providing information on technical matters, such as risk analyses, and emission data. The public needs to understand the numbers we bombard them with in the context of the other decisions they face.

Title I—Elevation of the EPA to Cabinet Rank

Title I of S. 171 can provide most of these benefits, but in the process of establishing the new Department, we should not create long term programs that could further complicate the mission of the Department and use resources better saved for existing programs. We recommend that the proposed functions of each new entity be reviewed carefully against the present or potential functions of existing entities to avoid duplication, overlap and unnecessary bureaucratic growth. Where existing organizations can do the job, the creation of new organizations, redundant of existing organizations should be eliminated in whole or in part.

We offer the following comments on Section 108 of Title I and Title II with a view toward minimizing overlapping authorities, data collection efforts and regulations of the various agencies with a role in environmental protection.

Section 108—Bureau of Environmental Statistics

We endorse the idea of establishing a Bureau of Environmental Statistics to collect and disseminate information about environmental quality. Compilation of this information will assist the public in understanding the overall effectiveness of environmental control measures. It will also help the government set priorities and spend its resources on those issues that will result in the largest potential for improving the quality of the environment. The simple act of compiling data from the many different agency data collection efforts will be useful.

While the new Bureau will be beneficial, we do not support any authority to make any new data collection requirements. All authority to collect information

from the public should be included in the basic statutes. We believe Section 108(a)(2) specifically provides those restrictions.

We are concerned that the Bureau is directed to analyze and publish information on "the effects on the public and the environment of those pollutants" Section 108(a)(A)(ii). This analysis is not a statistical function, the capability and duty lies in Agency for Toxic Substances and Disease Registry (ATSDR), Centers for Disease Control (CDC) and other parts of the EPA. Overlap of that responsibility with the new "Bureau" is not efficient or within the mission of the bureau to publish environmental data.

We are also concerned that the responsibilities proposed for the Bureau may overlap with responsibilities already assigned by law to the Department of Energy. For instance, Section 1605 of the Energy Policy Act of 1992 assigns to the Secretary of Energy responsibility for collection of certain statistics regarding greenhouse gas emissions. The language of Section 108 should be revised to make clear that any information collection or coordination responsibilities created for EPA by this act are subordinate to such responsibilities already assigned by law to other agencies.

We endorse the stipulation in Section 108 (c)(4) that the proposed Environmental Statistics Annual Report include "economic information on the current and projected costs and benefits of environmental protection."

The principle that environmental protection actions or policies be based on rigorous economic analysis of the expected costs and benefits is critically important. We know the American people want a clean environment, so do we. At the same time, we believe that the American people also highly value the many benefits of an expanding economy. A good and rising standard of living is still a part of the American dream. So, CMA believes it is imperative that the effect of proposed environmental protection measures on important American values—including but not limited to environmental protection—be fully and methodically considered.

There is another important point. We live in an era of scarce resources. Our Federal Government is running an enormous deficit and accumulating debt at an alarming rate, debt which threatens the well-being of our children and grandchildren as well as ourselves. Our manufacturing industries, including the chemical industry, are operating in an increasingly competitive global environment where constant attention to efficiency and costs is critical not only to continued prosperity, but to survival. Under these circumstances, only the most thoroughly justified and highest priority measures which impose new costs on government or industry are defensible.

Given the importance of cost analysis to environmental protection measures, CMA proposes that an additional "general finding" be added to Section 102 of S. 171 to recognize this point.

Title II—Interagency Committee on Global Environmental Change

The International Energy Conference proposed in Sec. 201, and the International Greenhouse Gas Monitoring Program proposed in Sec. 202, both seem duplicative of ongoing activities a) within the Organization for Economic Cooperation and Development (OECD), International Energy Agency (IEA); b) the Intergovernmental Panel on Climate Change (IPCC) of UNEP and WMO; and, the Intergovernmental Negotiating Committee and, after ratification, the Conference of the Parties of the U.N. Framework Convention on Climate Change. *We recommend that this Title be deleted.*

Title III—Commission on Improving Environmental Protection

CMA believes that Title III is an important and potentially very promising feature of S. 171. Creation of a commission on Improving Environmental Protection to review laws, policies and regulations to unite and rationalize environmental protection programs is sorely needed.

Members of CMA and others in the regulated community are frequently confounded, frustrated and baffled by conflicting, overlapping and duplicate requirements. The result is sometimes reduced protection for the environment and in many cases expenditures for no net improvement in protection.

The commission should seek a broad array of opinions from the public and members of the regulated community. We applaud the creation of advisory groups in Section 305 to provide input. We request that industry be specifically included as members of one or more of advisory groups created to assist the commission.

The commission could, if well staffed and funded, produce recommendations that would streamline and prioritize the Nation's environmental objectives. It could help us spend resources where they are currently needed rather than in programs and activities that no longer have relevance. Likewise, they could help us refocus on unfinished business before we reach for new objectives.

QUESTIONS AND ANSWERS SUBMITTED FOR THE RECORD

Question 1:

The bill before us today calls for the creation of a Bureau of Environmental Statistics and various commissions and conferences. The CBO estimated last year that in the first year the cost for the environmental statistics proposal would be \$2.8 million and thereafter \$5.4 million per year. The Energy Conference \$5 million, the Environmental Law Commission \$8 million over two years and the Commission on Data Collection \$250,000 per year.

Will the EPA budget be increased by the amount of spending called for in this bill?

The Agency is currently formulating its fiscal year 1994 budget request to Congress, hence proposed funding levels are not final. Once a Cabinet status bill is enacted, we will look at the new requirements of the Cabinet status legislation and available funding. We will have to balance the funding demands of this legislation with ever increasing expectations for environmental protection within the resources made available to the Agency.

Question 3: Commission on Environmental Protection

The bill also establishes a commission to study and make recommendations on our environmental laws.

My concern results from a study that was jointly conducted by the EPA and Amoco on the potential for pollution prevention at a refinery. The study concluded that if a facilities wide pollution prevention approach were established, pollution reductions as required under the law could be achieved at 25 percent of the cost of existing programs. Nonetheless, EPA concluded that such an approach was inconsistent with agency policies and possibly inconsistent with its statutory authority.

I would like to receive further clarification of this conclusion.

(1) How could such an approach be inconsistent with EPA policies and be inconsistent with current authority?

(2) Please provide me with specific examples and recommended changes to the statutory language.

(3) Is the currently ongoing internal management review evaluating the need to enhance and strengthen the management and coordination of environmental programs?

The joint EPA/Amoco project provided a good opportunity for the Agency to work cooperatively with industry to examine how regulatory requirements work together at a specific facility, in this case a refinery in Yorktown, Virginia.

Among the conclusions of the Yorktown study was that the facility could meet environmental quality targets more cost-effectively than currently is possible under existing statutes and regulations. While EPA and Amoco may have some disagreement on the extent of potential cost savings, clearly such savings would be possible if sources could approach compliance through pollution prevention and control from a facility-wide standpoint to a greater extent.

However, a facility-wide approach to compliance often is not possible. EPA has been charged by Congress with implementing statutes that, in many cases, are relatively prescriptive and which do not allow sources to trade-off compliance among statutory mandates, even if the result of such cross-media tradeoffs might be equal (or even greater) pollution reduction at a lower cost. It is my understanding that Amoco itself has come to this conclusion after commissioning an independent legal analysis.

For refineries and other industries, coordinating the timing of compliance with different requirements is often the biggest problem. Often the timing of regulatory requirements from different EPA offices is driven by different deadlines in two or more statutes. This can prevent sources from developing one compliance strategy that optimizes all the requirements at the same time.

Clearly these are difficult and important issues to be sorted out. The Clinton Administration is committed to tackling these kinds of problems as we seek to harmonize environmental protection and economic growth, as well as make government more efficient and responsive. It is my view that statutory barriers of to cost effective environmental protection the sort you highlight must be addressed as we work with Congress in the upcoming round of statutory reauthorizations.

Question 4: Risk Assessment and Risk Management

Have you considered whether it would be appropriate not necessarily as part of the EPA elevation legislation to create an independent agency that is outside of EPA to develop risk assessment?

The Agency has considered this issue on a number of occasions over the past ten years. The 1983 National Academy of Science (NAS) report addressed this question and found that, although a conceptual separation of risk assessment and risk management was necessary, the process by its nature needed to be interactive and did not support an independent group of risk assessors. The wisdom of that finding has become more evident as the need to tailor risk assessment findings to statutory language was recognized; as the need to have Agency experts defend risk assessment findings in the courts has grown; and as Agency priorities determined the need for specific risk assessments. Each of these would be difficult if not impossible if an independent agency were producing "one size fits all" risk assessments.

This is not to say that there are no benefits from attempting to have uniform approaches to Government risk assessments. Various groups have been established to work toward that end in the last ten years. The most recent through the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET), has made significant progress in this area.

Question 5:

Commentators have suggested that programs currently managed by other departments should be consolidated within the EPA.

For example the Carnegie Commission and the Institute of International Economics recommend, at a minimum, that programs from the Commerce Department (e.g. NOAA) and the Interior Department (e.g. USGS) should become part of the EPA.

Would you please comment on these recommendations.

I noted in my testimony one of the primary reasons for elevating EPA to cabinet status is to improve environmental policy integration and coordination among Federal agencies. However, I would not support a restructuring of environmental programs from other Departments as part of the EPA Cabinet legislation. Major improvements in integration and coordination across Departments can be made through better communication, information sharing, and joint problem solving. For instance, I now meet personally on a monthly basis with the Secretary of the Department of Interior, the Department of Agriculture, and the Department of Energy, to foster this type of collaboration across the Executive Branch.

RESPONSES TO WRITTEN QUESTIONS FOR THE RECORD

Q. 1: In general, we have heard suggestions that the organization of environmental policy activities throughout the Federal Government could stand a good scrub at the least and a wholesale reorganization at the most. This might include placing the National Oceanic and Atmospheric Administration (NOAA) into the new Department. What are your feelings about any such reorganization?

A.1: I noted in my testimony one of the primary reasons for elevating EPA to cabinet status is to improve environmental policy integration and coordination among Federal agencies. However, I would not envision a restructuring of environmental programs from other Departments as part of the EPA Cabinet legislation. Major improvements in integration and coordination across Departments can be made through better communication, information sharing, and joint problem solving. For instance, I now meet personally on a monthly basis with the Secretary of the Department of Interior, the Department of Agriculture, and the Department of Energy, to foster this type of collaboration across the Executive Branch. In addition, I now participate in weekly meetings with the Vice President, the head of the National Oceanic and Atmospheric Administration, and other agencies to discuss issues of mutual concern. It is possible that restructuring the Federal Government may ultimately be the most efficient way to make needed improvements. But it's not clear to me at this time that there is any clear rationale—or consensus—for the basis or form that such a major reorganization would take.

Q. 2: With respect to the EPA itself, our bill requires a Commission to study, among other things, environmental function organization within the agency. How do you view such an effort? Also, what are your thoughts about the way the Agency is organized now? Should we, for example, be contemplating a different way to organize the assistant administrator function—instead of by media (air, water, radiation, etc.) by source or sector of pollution (industrial, agricultural, municipal, etc.) or some other formulation?

A. 2: My view is that the Commission has a number of important things to consider. I welcome its recommendations on how to make more efficient or effective environmentally related programs. And I welcome its recommendations on prevention, ecosystem, and multimedia approaches that would help to improve environmental protection in this nation. Some of its recommendations would obviously have organizational implications if the Department were to adopt them. However, I believe it is the privilege of the Executive Branch to organize itself to meet its statutory and other administrative requirements. I would look to the Commission's report to help frame the dialogue and issues related to how environmental work could most effectively be achieved in the Department so that I could use that as a springboard for discussion and decision about the organizational implications.

With respect to the way the Agency is organized now, I am aware of interest and discussion both internal and external to the Agency on restructuring our work along non-media lines. EPA's mission and legislative base are enormously complex, particularly when viewed within the context of non-source pollutants, the adequacy of science and research, the severity of old technological effects, and the ambiguities of new technologies.

As you well know, EPA was organized by media in the early 70's because it was the easiest way to both blend disparate organizations from across the Federal Government into the new agency and to meet its media-specific statutory requirements. Although the current media structure requires more effort in order to look at broader environmental issues and impacts, I am not in a position at this time to state whether or how the current structure should be revised. I am committed to making the current organization in EPA responsive to the needs of our statutory mandates and to the citizens of this country. Through cross-media programs like our policy clusters and issue-based research program, by strengthening our risk-based and pollution prevention policies, and through continued agreements with other Federal agencies, I believe we can continue to address pollution problems from media perspectives, sector perspectives, ecosystem perspectives, and source perspectives. I want to withhold judgment on a more formal restructuring away from a media orientation until I can better assess the strengths and weaknesses of the current structure.

Q. 3: Do you think the number of Assistant Secretaries allowed in the bill is adequate and, if not, how many would you propose?

A. 3: The bill currently provides me three additional Assistant Secretaries beyond what I currently have. I believe this is an adequate number to provide me the flexibility to reorient the Agency and its management structure in new ways.

Q. 4: It has been suggested that because EPA does not have a formal, overarching legislative mission but instead is guided by a dozen or so separate pieces of environmental legislation, it has set up program offices that have tended to focus solely on reducing pollution within a particular environmental medium for which the office has responsibility. One solution to this problem might be to enact a unified environmental statute whose focus would be reducing overall emissions. What are your thoughts about this idea?

A. 4: EPA has four media-specific program offices. Our offices of Air, Water, Solid Waste and Emergency Response, and Pesticides and Toxic Substances all share in the responsibility of meeting the statutory goals and commitments contained in the major environmental statutes under our purview. We also have a number of cross-media offices, such as our Offices of Enforcement, Research and Development, and Policy, Planning and Evaluation. Together, these program offices focus on preventing and reducing pollution across all media. There's no doubt that having an organic environmental statute in place which provided a clear legislative statement of EPA's mission, goals and priorities would be beneficial in improving program efficiency and intra-agency coordination.

In its absence, however, the Agency has taken steps to address environmental problems that warrant multi-media consideration. For example, the Agency's planning and budget development process considers comparative risk issues across and within media; our regulatory development system allows for cross-media review and analysis when it appears to be warranted our issue-based research program allows a multi-media approach to define and set strategic directions for our research; and we have applied a "clusters" management approach to key issues like lead, pulp and paper, and contaminated media to assure cross-media deliberations.

An organic environmental statute that would enable EPA to better set priorities among different programs, that allowed EPA to compare the economic effects of all programs with the reductions in risks to human health and the environment, that facilitated pollution prevention across media, that allowed EPA to better address multi-media environmental problems, and that supported our efforts to anticipate and identify new environmental problems would be good for EPA. At this time, however, it is not my top legislative priority.

Q. 5: Some criticisms have been raised over the course of EPA's existence about the way in which regional offices function and a perceived lack of coordination and good communication between headquarters and the regions. Could you comment on this and tell us how you think a Department will be able to better integrate the functions of the regional offices with headquarters' mission objectives?

A. 5: The relationship between Headquarters and the Regional offices is complex, and does have some inherent tensions. The Agency strives for balance between providing a nationally consistent policy/program, and allowing flexibility to address varying needs. Inevitably, some conflicts will arise. New laws have required extensive rule development while greatly increasing requirements on field offices (inspections, enforcement, permits, plan review, grant oversight, etc.). As a result, coordination and discussion between Headquarters and regional offices about the proper allocation of responses and the allocation of limited resources is inherent to achieving workable solutions.

Communications and interactions between HQ and the Regions are facilitated in several ways. Each program area has an identified Lead Region, which provides HQ with program advice on budget and policy issues from the regional perspective. Senior managers across the agency meet on a regular basis to discuss priorities and cross-cutting issues, and make adjustments to Agency direction if needed.

Perhaps most important to our HQ/Regional integration are efforts underway to articulate a set of overarching national environmental goals, from which EPA will develop an integrated Agency plan for the future. Constructing a plan that will provide the flexibility to address unique and/or highest risk areas, while demonstrating progress toward meeting national mandates, presents a tremendous challenge as well as a singular opportunity for EPA. Agency goals and an integrated plan will provide a common basis/framework for making budget, policy, and future legislative decisions that will guide the environmental agenda for the country.

Q. 6: How well is the Agency currently organized, and how might this change with respect to extramural and intramural Research funding and programs? Can EPA do a better job in this area and do you have any specific organizational suggestions for how this might be done?

A. 6: EPA has reorganized its research and development activities several times since the Agency was established over two decades ago. EPA recently reported to our Appropriations Committees on this matter.

Substantial improvements have been made to improve our research planning and organization. However, as noted in recent studies on environmental research and development by the Carnegie Commission and the National Research Council, we do not have a coordinated, national research program sufficient to meet the demands for better data and solutions to environmental problems. To help set the stage for these efforts, the President's fiscal year 1994 budget includes a request for \$50,000.00 to develop specific proposals for improving EPA laboratory operations and organization.

No. 7: Administrator Browner, this Committee last year held a hearing which concluded that the EPA was essentially held captive by some of its contractors. Agency officials testified that, at least when it came to its major computer operations, EPA could not perform the tasks itself and would have to immediately hire another contractor if for any reason the initial contractor was barred or could no longer provide the services. And while contractors may not be managing the Agency, EPA has not done a good job of managing the contractors—this has been going on since EPA was created 20 years ago.

Q. 7: A) What are you going to do to ensure that a Department of the Environment is not held captive by its contractors?

A. 7: A) As promised in my testimony, I will conduct a baseline review and an independent assessment of the Agency's budget and staff resources. A primary purpose of these reviews will be to ascertain the ability of the Agency to properly manage its extramural resources, including contracts. If the Agency does not have adequate resources to manage its contractors in a manner so that we are not held captive, we will either need to obtain the resources required or limit the amount of our contracted activity.

Q. 7: B) Last year, in response to this hearing, EPA created a standing panel on contract management to institute reforms. Have you reviewed these reforms and do you support them?

A. 7: B) I have reviewed the Standing Committee on Contracts Management report, "Contracts Management at EPA: Managing our Mission", and support the recommendations completely. The Agency has made significant progress toward implementing many of the reforms. The impact of the reforms will take time, however, to alleviate serious problems in contract management within the Agency which have persisted over a number of years.

Q. 8: It is my understanding that the EPA Inspector General is about to release additional reports on contracting abuses and mismanagement by the Agency, which would seem to indicate that these issues are far from resolved. What additional steps will you take, and report back to this Committee on, so that we can get beyond contracting and back to cleaning up the environment?

A. 8: As stated earlier, the impact of the reforms initiated last year will take time to have an impact across the Agency. If any new findings by the Inspector General indicate that our reform activities are or will be inadequate, I am committed to re-examining the reforms and taking new directions if necessary.

Q. 9: I should note that we will be holding hearings later this year on EPA contracting. Will you testify before the Committee at these hearings?

A. 9: I appreciate having had the opportunity to testify before the Committee on the Agency's management of its contracts. We will continue to work together to address this issue.

Q. 10: The EPA Inspector General and others have concluded that in many cases EPA has paid more for work done by contractors than if the work had been done by Agency personnel.

Q. 10: A) Do you agree that the Agency should know if the work done by contractors will cost more than the work done by the Government before awarding major contracts?

A. 10: A) I agree that we should know if contract work is more expensive than performance by Agency personnel before award of a major contract. Such information is vital in reaching a decision to contract out. However, the Agency would still need staff resources before consideration could be given to performing contracted work by its own employees.

Q. 10: B) As part of its efforts to constrain costs, would you support EPA undertaking a cost/benefit analysis on major pending contracts to better understand how to best spend its limited resources?

A. 10: B) I believe such an analysis could be beneficial, but would be meaningful only if the size of the Agency's staff were large enough so that serious consideration could be given to performing work within the Agency that would otherwise be contracted out.

Q. 11: A critical feature of improved environmental management is establishing priorities among programs on the basis of risks to public health and the environment. There have to be adequate scientific bases on which these priorities are determined. What will a new Department of the Environment do to undertake this critical activity?

A. 11: The new Department will take the actions recommended in the 1990 report, *Reducing Risk: Setting Priorities and Strategies for Environmental Protection* to ensure that this nation uses all the tools at its disposal in an integrated, targeted approach to protecting human health, welfare, and the ecosystem. A new Department of the Environment will maintain and improve information on the nature, extent and control of health and environmental hazards such as: toxicity of individual pollutants; exposures to harmful pollutants; and carcinogenic and other health effects. The new Department would continue to refine cancer risk assessment methodologies and to better understand and assess the effects of threshold (non-cancer) toxicants on human health. Programs such as the Environmental Monitoring Assessment Program and other ecological research programs would develop information on ecological risks and strengthen the Department's capability to assess the health and functions of ecosystems and the options that are available for mitigating ecological risks. These efforts will inform the public and Congress about what is known and what is not known about particular environmental risks and offer them guidance on ways to reduce health and environmental risks.

The Department would also use scientific methods to estimate which hazards appear to pose the greatest risks to society and use this information as a key component in developing environmental national environmental protection goals and priorities with Congress and the public. The challenge for EPA will be to use this information more effectively in its planning, budgeting and performance measurement systems. Another challenge is to better communicate this information to state and local environmental decision makers, given their role in managing environmental risks.

Q. 12: One of the greatest management weaknesses in EPA is the Superfund program. GAO's report to us in January indicated that EPA has continually failed to utilize basic cost control techniques including invoice reviews, audits, and independent cost estimates. What specifically will you do about these weaknesses, which EPA itself characterized as material weaknesses in its 1991 Federal Managers' Financial Integrity Act report?

A. 12: Along with GAO, several EPA groups, including the *Standing Committee on Contract Management (SCCM)* and the *Administrator's Task Force on Superfund Alternative Remedial Contracting Strategy (ARCS)* Contracts, have made recommendations as to how basic cost control techniques may be strengthened. In response to these recommendations, the following actions have been taken:

1) **Invoice Review:** An OSWER directive, issued 01/31/92, requiring standard review of cleanup contractor invoices is expected to result in improved cost control through withdrawal of unreasonable costs. In addition, in 1992, all Superfund managers were trained in contract cost control techniques.

2) **Audits:** EPA's Office of Inspector General (OIG) has developed a strategy and schedule to complete pending financial audits by 10/30/93. To increase control over the scheduling of audits, those firms having EPA as their largest single client will have audit responsibility transferred from the Defense Contracting Audit Agency (DCAA) to EPA's OIG.

3) **Independent Government Cost Estimates:** An OSWER Directive issued 01/31/92 requires use of independent government cost estimates on all projects valued over \$25,000. Superfund has also trained all of the Agency's Cost Estimators in use of state-of-the-art cost estimating software. Finally, to ensure consistency, Superfund has developed a cost estimating guidance for use by cleanup project managers and support personnel.

Continuing the implementation of these and subsequent recommendations of the *ARCS Task Force* and *SCCM* will remain one of the program's highest priorities.

Q. 13: GAO also notes that EPA's indemnification of its Superfund contractors has been virtually unlimited, even though the law intended there be some limitation and it is certain that Superfund contractors would work for much lower limits. What do you intend to reduce Superfund's exposure to the unlimited liabilities implied in these indemnifications?

A. 13: On January 25, 1993, EPA published Indemnification Guidelines in the *Federal Register*. The Guidelines provide that:

- No indemnification will be offered in new solicitations unless it can be shown that the lack of indemnification was a prime cause of insufficient competition.

- Existing response action contracts will be renegotiated within 180 days to incorporate limitations and deductibles as specified in the Guidelines (e.g., maximum indemnification is \$75 million for large, 5-year contracts, with a \$3.2 million deductible).

To reduce Superfund's exposure to unlimited liabilities, I intend to implement these guidelines.

Q. 14: In 1991, EPA's Inspector General found that an integrated financial management system had still not been implemented at the Agency because of inadequate resources and management attention. What is the priority you attach to this effort and what role will the Senior Council on Management Controls play?

A. 14: The full implementation of the Agency's Integrated Financial Management System (IFMS) received high priority in the fiscal year 1993 operating plan. Despite the significant reduction taken in EPA's Management and Support budget this year, we were able to hold the \$5.4 million in contract funding set aside for IFMS harmless.

We recognize there have been continual problems, and for the first time reported certain aspects of IFMS as material weaknesses in the Agency's December, 1992, FMFIA Assurance letter sent to the President and Congress. The Senior Council on Management Controls and the IG were actively involved in the process which identified both accounts receivable and accounting system, and related financial management problems as reportable material weaknesses.

We have developed corrective action plans with timetables to rectify these problems. The Senior Council on Management Controls will be briefed during their quarterly meetings, and will be actively involved in monitoring the plans and helping to resolve any roadblocks we may encounter.

Q. 15: This lack of follow-through also characterizes EPA's enforcement program. After numerous government reviews pointing out that EPA's regional offices were not assessing penalties against violators at least as great as the amount by which the companies benefit by not being in compliance, the agency sent around a memo urging them to adhere to agency policies and to document reasons for any penalty reductions. However, as GAO reported to us last month, little has changed; two-thirds of closed cases did not document penalty calculations. What will the new Department do about this very important problem?

A. 15: Office of Enforcement believes that the cases identified by GAO as lacking documentation of economic benefit were largely matters in which the economic benefit component was nominal and thus not required. Unfortunately, there was no reference in the case file to the determination regarding whether to seek to recover the economic benefit. To address this concern, we will issue guidance that clarifies the need to document the economic benefit determination whether or not its recovery is required based on the facts of the particular matter. This documentation will be included in the case file along with the other penalty documentation. EPA continues to pay close attention to the issue of penalty documentation. On August 9, 1990, for example, the Office of Enforcement issued a policy entitled "Documenting Penalty Calculations and Justifications in EPA Enforcement Actions." This document established a uniform system for documenting penalty calculations by requiring the submission of a written "penalty justification" in every settlement package submitted to Headquarters. OE requires that each case file, whether administrative or civil judicial, contain documentation of the current bottom line settlement amount agreed to by the members of the litigation team. With respect to civil judicial cases, OE has been particularly successful in ensuring that the case files contain penalty documentation.

GAO's continuing concerns relate principally to administrative cases and revolve around the failure to regularly document the economic benefit component of the penalty calculation. Significantly, under its policies, EPA does not require recovery of economic benefit in all cases. Where, for example, the economic benefit of non-compliance is calculated to be under \$5,000, economic benefit is deemed to be "nominal" and thus not a critical component of the penalty.

Moreover, the Office of Enforcement is exploring vehicles for improving the monitoring of administrative penalty matters generally. One possibility may be to require that, upon settlement of administrative cases, OE, in coordination with the appropriate Program office, will ask that the Regions send copies of the settlement agreements to Headquarters. OE will monitor and review these case settlements to ensure that national policy concerns, including penalty documentation, have been met. In this way, OE will afford "real time" audit and monitoring of settlements.

Q. 16: S. 171 includes a provision respecting EPA international activities and responsibilities. Specifically, the bill calls for the Secretary of Environment to assist the Secretary of State in carrying out international negotiations and discussions

on environmental matters. We also authorize the new Department to provide technical environmental assistance to foreign governments and international bodies. How important do you think this provision is?

A. 16: EPA believes that the international authorities of the Department of the Environment are extremely important. It is essential that the Department of the Environment play an active international role in order to assure that U.S. policy on important international environmental issues is fully integrated with, and in furtherance of, the Department's mission to protect the environment.

U.S. international environmental policy needs to be closely coordinated with our domestic environmental program, both because the international policy should be informed by and seek to further the U.S. domestic environmental agenda, and because the international obligations of the United States can be honored only through development and implementation of domestic laws and regulations. A subordinate international role for the Department of the Environment would diminish its ability to ensure that the United States pursues a vigorous international environmental policy that is consistent with, and implemented by, its domestic program. It is also critical that the new Department's prestige and effectiveness in the U.S. and abroad be retained.

Currently, EPA's authority to conduct international activities is derived from a patchwork of statutory sources whose international scope is not always well defined. S. 171 would clarify and simplify the new Department's authority to conduct the activities enumerated in § 103(f) (1) (B) which include those currently engaged in by EPA. The language of § 103(f)(1)(B)(ii) authorizes the Department of the Environment to improve the quality of the environment through: a) the use of contracts, assistance agreements, interagency agreements, international agreements, and other arrangements for supporting or conducting activities such as education, training, monitoring, research, development, investigations, experiments, demonstrations, surveys, studies and emergency response; b) the provision of technical, financial, legal and other assistance; and c) cooperation with foreign governments and international organizations.

Q. 17: Can you give us some specific examples of where such assistance may be rendered?

A. 17: EPA currently gives environmental assistance, sharing its accumulated expertise, to the countries in transition in Central and Eastern Europe. This assistance is provided through the Asian Environmental Partnership to developing countries in Asia, and the Enterprise for the Americas Initiative to developing countries in Latin America and the Caribbean. This environmental assistance is coordinated with the Agency for International Development (AID), the Department of the Treasury and other U.S. agencies. The work with AID will carry on, and will be expanded to include the countries of the former Soviet Union. Assistance to Mexico in connection with the 1983 Border Environment Agreement and the 1992 Integrated Border Environmental Plan is continuing, and increasing as a result of supplemental activities in connection with the North American Free Trade Agreement and the proposed North American Commission on the Environment. The new Department would continue this important bilateral assistance work.

Q. 18: Environmental concerns are obviously very important in trade agreements and will likely become more so in the future. Existing trade agreements may not adequately address these concerns. Conflict and disparities in enforcement and monitoring capabilities are and will remain critical issues. What role can the new Department play in ensuring environmental protection issues receive adequate attention in these proceedings?

A. 18: The new Department will be able to play three roles, if it is given adequate funding and access to the appropriate processes. First, the Department will be able to evaluate enforcement and monitoring programs in and to engage in cooperation and training activities with other countries to help improve enforcement and monitoring functions. Second, if EPA has access to the Trade Policy Review Group (TPRG) and related bodies (EPA currently is not a member of the TPRG, but is sometimes invited to participate), the new Department will be able to ensure that environmental concerns raised by trade policy and trade agreements are identified and considered. Third, if EPA can play a meaningful role in negotiating future trade agreements (as occurred with the North American Free Trade Agreement), the new Department will work to ensure that environmental considerations are taken into account in the text of those agreements.

Q. 19: The Toxic Substances Control Act gives EPA authority to obtain information about effects on human health and the environment of chemicals. However, since the law's enactment 16 years ago, EPA has identified for testing less than 1 percent of more than 70,000 chemicals and has complete test data for only 22

chemicals. This is just one example of how EPA has not collected adequate data in the risk assessment area. The Bureau we create in our legislation would certainly aid this situation. What is EPA currently doing to improve its databases? And do you support our Bureau of Environmental statistics provision?

A. 19: There are three aspects to the question. The first relates to the adequacy of EPA's efforts to date to acquire the data needed to do meaningful risk assessments of chemicals or other contaminants that may pose hazards to human health or the environment (hereafter referred to as potentially toxic substances). The Bureau, by providing guidelines for the collection of information by the Department, should improve data collection at all levels of the Agency. However, specific determinations as to the adequacy of the data available for making risk assessments for individual potentially toxic substances must remain in the offices of the Department of the Environment with regulatory responsibilities. Similarly, specific actions to require additional testing of potentially toxic substances will continue to be made by these same regulatory offices.

The second questions relates to the adequacy of EPA's efforts to keep track of these potentially toxic substances and of the information available about the risks posed by each of these substances or class of substances. EPA has already made progress in assembling and disseminating information on potentially toxic substances and risks posed by each of these substances or classes of substances. Following are some specific examples.

The Office of Regulatory Management and Evaluation (with significant support from the Environmental Statistics and Information Division) has led an Agency-wide effort to design and implement the Register of Lists, a new EPA-wide electronic data base that is intended to serve as a central repository of information about the various chemical lists established by EPA for regulatory purposes. The Register of Lists provides information about the purpose of the list, identifies the substances contained on each list, and identifies the EPA regulatory office responsible for each list. The Register of Lists currently contains over 3,437 chemicals and chemical categories contained on 31 major EPA lists.

The Integrated Risk Information System (IRIS), maintained by the Office of Health and Environmental Assessment within EPA, contains a comprehensive summary of available risk information for a smaller number of substances. IRIS currently contains information on 509 chemicals, and OHEA continues to increase the number of chemicals included in it.

A third major data base is the Inventory of Chemicals in Commerce, discussed above, which is maintained by the Office of Pollution Prevention and Toxic Substances in its role as the EPA office with principal responsibility for carrying out the requirements of TSCA.

In answer to the question about what EPA is doing to strengthen its database, EPA is working to strengthen its information resources management (IRM) program. The strategic IRM planning process is being revamped to provide a consistent, integrated planning process, linked to the budget, for the direction, control, and coordination of IRM resources across the Agency. EPA's Information Management/Data Administration Program is applying a structured approach to implement Agency-wide improvements in data administration. At the same time, EPA is strengthening its central management of IRM policies, standards, and procedures, as well as its IRM oversight program to ensure the quality of its information programs and systems. EPA is also implementing technical solutions to facilitate data integration, such as development of a common software interface (Gateway), application of Geographic Information Systems (GIS) to various analyses, and implementation of a locational data policy to facilitate the link between geographic and programmatic data. These activities, combined with the IRM elements of the Cabinet legislation, will have a beneficial impact on EPA's management and use of information.

The Chief Information Management Officer and the proposed Bureau of Environmental Statistics will clearly be major participants in building on these ongoing efforts to improve the Department's ability to identify, retrieve and disseminate information it possesses about potentially toxic substances. The improved accessibility of this information will in turn allow the Department to make better determinations regarding the existence of major information gaps and to take the necessary measures to fill these gaps.

Yes, EPA and the Administration support the creation of a Bureau of Environmental Statistics as called for by S.171.

Q. 20: Should EPA, itself, have better data collection capabilities?

A. 20: Existing statutes for the various EPA programs have extensive authorities for the collection of data; nevertheless, the coverage is a "crazy quilt" pattern with

duplicate coverage in some cases and gaps in coverage in others. This is not unexpected since these statutes are primarily intended to support specific regulatory activities (rather than provide comprehensive assessments of environmental quality). This patchwork of authority makes it difficult to collect data for cross-media statistical purposes that would provide information needed for national environmental policy making.

Data Collection Authority Limitations. At present, EPA's statutory authorities to collect, compile, and analyze environmental data are primarily for regulation development, pollution abatement and control, or enforcement. The authority for pollution abatement and control and enforcement is largely delegated to state and local governments. Some statutes put the onus of data collection on chemical manufacturers, sewage treatment plants, and other regulated entities. In addition, data collection components of many environmental protection statutes are specific and limited which makes it difficult to collect the types of ambient measures, demographic measures, economic measures and human health information needed to support environmental decisions and strategic planning, however, much of this statistical information is already collected by other agencies. BES can enter into effective joint statistical programs with these agencies as long as it is authorized to abide by the confidentiality restrictions imposed on statistical data. This approach will avoid duplication of effort and assure that consistent information is used in all the affected agencies.

Q. 21: The management of available environmental data has also been a problem at EPA. EPA has three data bases for regulating disinfectants, yet EPA officials have told the GAO that as much as 60 percent of the data on disinfectant product claims are inaccurate or incomplete. In another case, EPA maintains nine separate database management systems to track information about pesticides awaiting reregistration, including the results of health and environmental studies. Yet, when, in 1991, a trainload of metam sodium spilled into the Sacramento River, EPA was unaware of information in its files indicating that metam sodium can cause birth defects. As a result the agency could not warn pregnant women and workers of the pesticide's hazards. What will a new Department do to better manage data it collects or compiles?

A. 21: EPA is already working to strengthen its information resources management (IRM) program to support integrated data needs of holistic environmental protection. The strategic IRM planning process is being revamped to provide a consistent, integrated planning process, linked to the budget, for the direction, control, and coordination of IRM resources across the Agency. EPA's Information Management/Data Administration Program is applying a structured approach to implement Agency-wide improvements in data administration. At the same time, EPA is strengthening its central management of IRM policies, standards, and procedures, as well as its IRM oversight program to ensure the quality of its information programs and systems. EPA is also implementing technical solutions to facilitate data integration, such as development of a common software interface (Gateway), application of Geographic Information Systems (GIS) to various analyses, and implementation of a locational data policy to facilitate the link between geographic and programmatic data.

These activities, combined with the IRM components of the Cabinet legislation which elevate the management attention and focus on IRM, will significantly improve the Program-specific, as well as cross-media, management of environment information across the Agency.

Q. 22: Throughout the Agency and within specific programs, EPA lacks performance measures and information for assessing the effectiveness of its programs in improving environmental quality. Sen. Roth and I have introduced legislation to institute such performance measures throughout the Federal Government through a pilot program. I believe a centralized bureau devoted to collecting such information could be extremely helpful in establishing such performance measures. Would you comment? Do you think EPA would participate in our bill's pilot program?

A. 22: EPA is presently engaged in an Agency-wide process to modernize its system of performance measures. The goal of its Strategic Targeted Activities for Results System (STARS) is to develop "families" of performance measures for each of a dozen or so major, measurable environmental goals, which are also under development. These families of performance measures will track Agency progress toward:

- improvements in environmental quality,
- changes toward more responsible behavior by industry, government and the public, and
- toward institutional goals for EPA, such as better management, employee morale, and customer satisfaction.

EPA will begin pilot scale implementation of the new system in early fiscal year 1994. EPA would therefore be well positioned to pilot a new government-wide system of strategic planning, performance measurement and budgeting on the schedule in the proposed "Government Performance and Results Act" (S.20).

Q. 23: A proposal has been made to establish a National Institute for the Environment to support interdisciplinary research, assess current environmental knowledge on policy, and improve access to environmental information through education and training. How well do you do these things now and what is your opinion of this proposal?

A. 23: Many of the activities mentioned in the proposal are currently part of the Agency's programs. The extent to which these activities are carried out is related to the level of resources directed at these activities. It is felt that within the existing resource constraints, these activities are currently being carried out well.

The National Research Council recently issued a report, *Research to Protect, Restore, and Manage the Environment*, which raises several options for improving our national environmental research efforts. The National Institute for the Environment is among the options raised. We are currently reviewing the report.

Q. 24: Would you consider the creation of such an entity (the NIE) more useful if it were somehow affiliated with the new department?

A. 24: The Administration supports elevation of the Agency to departmental status. However, affiliation with new entities, such as a National Institute for the Environment, should only be considered after this elevation and after a thorough study of all of the pros and cons of any such option.

Q. 25: A) Traditionally, when it comes to receiving attention and resources at EPA, do you think that science and technology has been treated as a stepchild?

A. 25: A) EPA has recognized that science and technology are critically important for decision makers to have objective scientific information as a basis for their activities. In support of that concern, the level of resources for research and development has grown steadily from \$347 million in fiscal year 1988 to \$508 million in fiscal year 1993.

Q. 25: B) The Carnegie Commission advocates the establishment of a Federal Interagency Environmental Technologies Program to support the development of environmental technologies by other agencies, the labs, and the private sector. Is this approach preferable to creating a new agency? Why?

A. 25: B) The approach is preferable to creating a new agency, because it would be more cost effective to build on EPA's and other Federal agencies' current infrastructure, scientific and technical capabilities, and expertise to undertake such a program, under the auspices of the recently-created FCCSET subcommittee on environmental technology.

Q. 25: C) In your opinion, is the new Department the best place to locate the Interagency Program? Why?

A. 25: C) The development of environmental technologies requires the joint efforts of several agencies, such as EPA, the Department of Commerce, and the Department of Energy. All have expertise and facilities that can make a significant contribution to an environmental technologies program. However, EPA is uniquely qualified to identify and prioritize environmental problems which new technologies may help us address.

Q. 25: D) What things can we do to ensure that the program receives cooperation from other Federal agencies that conduct R&D?

A. 25: D) The Carnegie Commission Report entitled "Enabling the Future" recommends that Federal departments and agencies should integrate considerations of long-term science and technology goals into annual budgeting and planning efforts. The report encourages open communication and cooperation among senior R&D administrators within the Federal Government. Further, the report charges the Office of Science and Technology Policy (OSTP) and the Office of Management and Budget (OMB) to actively contribute to the establishment of Federal science and technology goals and to monitor progress of the Federal agencies in attaining these goals. The report urges OSTP to extend its efforts to use the Federal Coordinating Council on Science, Engineering, and Technology (FCCSET) to shape multi-agency, long-term science and technology goals. In fact, an Environmental Technology FCCSET subcommittee has been founded—it met for the first time in July 1993.

EPA has been an active participant in the several FCCSET subcommittees and would welcome an expansion of FCCSET's scope to generate specific longer-term Federal science and technology goals and performance measures. In addition, EPA has demonstrated a strong interest in harmonizing environmental research and development efforts among those agencies and departments that have extensive environmental interests and programs.

On March 25, 1993, laboratory directors and senior program officials from EPA met to continue discussions with the Department of Energy's (DOE) laboratory directors and program secretarial offices to identify opportunities for collaboration. Participants formed focus groups to examine the most promising environmental research-in-progress in the areas of: pollution prevention; remediation; ecology and monitoring; indoor air; and risk assessment. The expected result of this meeting is a joint environmental research action plan to be submitted to Secretary O'Leary and Administrator Browner for their consideration. Agency-to-agency senior level participation and commitment is vital to our efforts to harmonize on-going work, redirect planned projects to be more responsive to a broader Federal science and technology interest, and shape longer-term interagency environmental research and development goals.

Since July 1992, EPA's Office of Research and Development has been working closely with the Department of Health and Human Services to develop and implement a coordinated research strategy to address environmental health problems that exist along the U.S.-Mexico border.

We have begun preliminary discussions with USDA's Agricultural Research Service (ARS) to establish a similar dialogue. Meetings are planned with Department of Defense's Advanced Research Projects Agency (ARPA), Department of Commerce's National Institute of Standards and Technology (NIST), and the National Oceanic and Atmospheric Administration (NOAA).

EPA is eager to take a leadership role in promoting interagency cooperation in environmental science and technology. We need strong support from OSTP and OMB to achieve a totally integrated Federal environmental science and technology agenda, but direct agency-to-agency contact at the headquarters and laboratory level is an essential element for success.

Q. 25: E) In strengthening the new Department's scientific and R&D capability, how do we ensure that "science drives regulation" and not the other way around?

A. 25: E) Science encompasses a wide range of activities in EPA including research and development, technical and regulatory support, monitoring, data collection, review and interpretation of technical studies, and assessments of health and environmental risks. Science activities occur within the Office of Research and Development (ORD) as well as the program, policy and regional offices. In addition to the physical, chemical and biological sciences, EPA is also involved in the quantitative social sciences such as economics. The decentralized nature of science at EPA and the close relationship that exists between science and policy means that efforts must be taken to ensure that science is never adjusted to fit policy.

A 1992 report (*Safeguarding the Future: Credible Science, Credible Decisions*) prepared by a group of prominent scientists examines the role of science at EPA. The report calls for EPA leadership to undertake "... a deliberate and continuing effort to create the climate, culture, and incentives necessary to encourage superior science." The panel recommended several specific structural changes to better enable EPA to obtain and use the high-quality science it needs to realize its mission.

The relevant Credible Science recommendations include:

- Preparation of a coherent science agenda and operational plan to guide scientific efforts throughout the Agency and support its focus on relatively high risk environmental problems. Up-front planning on how to acquire and use the best scientific information, is a crucial step in ensuring that policy is based on solid scientific data and judgment.
- Clear definition of the science advice function (i.e., the process of ensuring that policy decisions are informed by a clear understanding of the relevant science) for the political leadership.
- Earlier science advice and information in decision process.
- Better career tracks for scientists and science managers. Although ORD has upgraded career tracks for research scientists over the past few years, scientists and engineers in program and regional offices need a more clearly defined career pathway that enables maintenance and growth in their disciplines (e.g., rotational assignments to sharpen skills, participation in professional societies, etc.)
- Agency-wide quality assurance and peer review for all key agency and technical efforts. Although research products are required to undergo peer review, EPA is developing a peer review policy for the planning and results of all scientific and technical efforts. This is essential if EPA is to be perceived as a credible, unbiased source of environmental and health information, both in United States and the world.

- Recruitment of several research scientists and engineers with world class reputations in science areas that are vital to the Agency's long-term strategy and direction.
- Increased scientific contact and openness with other organizations—other agencies, appropriate industrial and academic research organizations, professional societies, etc.
- Commitment to evaluate the environmental improvement brought about by major regulations and other policy decisions. EPA has recently initiated some new programs in this regard—such as the Environmental Monitoring and Assessment Program (EMAP), and the National Human Exposure Assessment Survey (NHEXAS)—and additional emphasis is planned.

EPA is currently reviewing the process used to develop environmental regulations and non-regulatory policies. One goal of this effort is to identify improvements in the way science and economics impact policy decisions. Revisions to the regulatory development process will likely include reforms that strengthen the applied research, scientific analysis and scientific review that is conducted to support major environmental policy decisions.

Q. 25: F) Can the Department—given its traditional role as a regulatory [agency]—overcome its past image to work closely with industry in this area?

A. 25: F) Although it is a regulatory Agency, EPA has developed the capability to work with industry in a non-regulatory way to reduce pollution. Three years ago, EPA began a program in Pollution Prevention based on cooperation from the industrial sector for its implementation. The program has demonstrated that industry responds positively to environmental protection programs when appropriate incentives are present. The innovative technology programs also have demonstrated that the Agency and industry can work together effectively to protect the environment. The Department can use this experience to identify new and constructive ways to work with industry for a healthy environment. Specific examples include:

- **Green Lights** The Green Lights program encourages the use of the most energy efficient lighting technologies that can dramatically reduce energy consumption and prevent pollution. EPA works with private companies to install energy efficient lighting wherever it is profitable. Over 750 corporations have already committed to the program;

- **33/50** The 33/50 program is part of a broad EPA program designed to encourage pollution prevention as a cost effective means of achieving reductions in toxic chemicals emissions. The program has an interim goal of a 33 percent reduction by 1992 and an ultimate goal of a 50 percent reduction by 1995 in emissions of 17 high priority toxic chemicals, using 1988 Toxic Release Inventory reporting of 1.46 billion pounds of pollution as a baseline. To date, 1,135 companies are participating in this program;

- **Water Alliance for Voluntary Efficiency (WAVE)** The WAVE program will encourage commercial businesses to use cost effective water efficient equipment to reduce water use and associated energy use. The program is just starting up and will initially be targeted to the lodging industry. Several large hotel companies have already committed to the program.

- **Golden Carrot** The Golden Carrot Super-Efficient Refrigerator Program is focusing manufacturing research and development toward efficiency in a manner never before seen for refrigerators. Under the program, which EPA helped develop with utilities and others, utilities have pooled almost \$30 million in rebate incentives to the refrigerator manufacturer that can produce the superior product. The manufacturer that can build the largest number of the most efficient, chlorofluorocarbon-free refrigerators the quickest and cheapest wins the contract. This program will ultimately save consumers \$240-480 million in annual electricity payments.

- **Energy Star Computers and Buildings.** Computers: Partnerships with 40 manufacturers will help create a market for energy-efficient desktop computers that cut energy use by 50 percent without sacrificing performance or raising prices. Clear market incentives are provided to manufacturers to improve the efficiency of their products and an effective mechanism for consumers to make informed purchasing decisions. Buildings: This initiative will stimulate the market for highly efficient heating, ventilation, air conditioning (HVAC), and water heating technologies. The program's first technology target will be variable speed motor drives for ventilation systems.

Q. 26: Does the Administration have a position on Senator Mikulski's proposal specifically to create an independent agency to fund environmental technology R&D?

A. 26: In general, EPA supports enhanced environmental technology initiatives, such as those recommended by Senator Mikulski (S.425), because they improve envi-

ronmental quality and strengthen the competitiveness of US technologies internationally. In this case, however, it is felt that using the framework of existing Federal programs is more cost effective and strengthens the linkage between R&D and environmental programs. For example, FCCSET has established a new subcommittee on the coordination of environmental technology research.

A Department of the Environment would enable the Nation's environmental agency to maintain a leadership role in environmental technology for a number of reasons:

1) The environmental technology market is created and shaped by EPA's (and State) regulatory and enforcement programs. EPA is in the best position from a Federal Government perspective to know the environmental technology needs, and to adopt rules and other programs to meet those needs. For example, marketable emissions credits or similar economic instruments can be a major incentive to encourage use of innovative technologies.

2) To be adopted, innovative technologies must gain regulatory acceptance by permit writers, on-scene coordinators, and rule developers. EPA involvement in development and evaluation of the technologies lends credibility to the innovations and enhances a new technology's ultimate acceptability.

3) EPA is viewed as an objective, honest broker whose reputation can enhance the worldwide acceptance of new technologies. EPA scientists and engineers have substantial experience, and EPA has existing laboratories and testing facilities that would be critical to the success of such a program.

4) The development and commercialization of environmental technologies require the joint efforts of agencies, such as EPA, DOC, and DOE. The establishment of a new Agency with overlapping functions would result in additional complexity and duplication to the hindrance of furthering innovative technology development.

Q. 27: Our Committee has scheduled a hearing on pollution liabilities and characterization problems throughout the Federal government. We are just beginning to learn the magnitude of the unknown universe of problems in every Federal agency. The Department of Interior, for example, has one of the largest environmental problems in terms of characterization and likely cost of cleanup in its Bureau of Land Management. The Department of Energy's environmental problems continue and grow in complexity and cost. What is EPA's and the new Department's role in helping other Federal agencies identify and begin efforts to remediate these problems?

A. 27: In order to assist Federal agencies in identifying environmental liabilities, and ensure a compliant and effective response to environmental problems, the Office of Federal Facilities Enforcement has begun building the Federal agency/EPA environmental partnership through a variety of both formal and informal mechanisms. These mechanisms provide Federal agencies with an opportunity to identify high priority environmental needs as well as an opportunity to demonstrate leadership among the regulated community.

Formal mechanisms include EPA's participation in a Memorandum of Understanding (MOU) with DOE, DOD and DOI and the Western Governors Association to establish a more cooperative approach to develop technical solutions to environmental remediation and waste management problems shared by states, commercial entities, and the Federal Government. The regional approach serves as a demonstration of principles and practices which may be adopted nationally.

Through informal mechanisms such as the Civilian Federal Agency Task Force, The Experts Work Group, and the Federal Remediation Technologies Roundtable, the Office of Federal Facilities Enforcement is working with Federal agencies in identifying deficiencies in Federal environmental management programs and cleanup efforts and forming workgroups consisting of EPA and Federal agency representatives to solve problems and meet high priority needs. In addition, EPA's OFFE convenes a monthly Federal Facility Policy Roundtable to brief Federal agencies and provide copies of new and imminent regulatory developments or other pertinent initiatives and programs that enhance agency compliance programs (e.g., environmental auditing and pollution prevention). EPA is also partnering with DOD and DOE on joint planning goals and to test innovative approaches to expedite cleanups including streamlining review of documents, test different decision making models, and test innovative technologies.

Future initiatives include the "Green Government" program intended to promote voluntary programs to improve environmental compliance through pollution prevention and encourage total quality environmental ("beyond compliance") management at Federal agencies. The Department of the Environment is the mandated agency to monitor and respond to Federal Agency environmental compliance activities and needs.

Q. 28: Last year the Congress finally enacted the Federal Facility Compliance Act (FFCA), which should strengthen EPA's hand in dealing with other agencies violations of RCRA and other environmental statutes. Could you comment on what the EPA is currently doing to implement this law and what future plans you have?

A. 28: The FFCA became law on October 6, 1992. This new Act only amends the Resource Conservation and Recovery Act (RCRA). There are several new authorities that will make RCRA Federal facility enforcement actions more consistent with actions currently used in the private sector.

The FFCA also requires the Administrator to undertake inspections at all Federal facilities that treat, store, and dispose of hazardous waste. EPA is determining the appropriate interpretation for this provision. On March 17, 1993 EPA sent out guidance regarding implementation of the new RCRA inspection requirements to the EPA Regions. In addition, EPA is also working on the appropriate mechanism for reimbursement of EPA by the Federal agencies for the cost of performing inspections. The RCRA Land Disposal Restrictions require treatment technologies and capacity be developed for mixed waste.

DOE, within 180 days of October 6, must submit two inventory reports: 1) a national inventory of all of its mixed wastes regardless of the time they were generated, on a state-by-state basis; and 2) a national inventory of its mixed waste treatment capacities and technologies. DOE has submitted these reports to EPA and the appropriate states. Both EPA and the states have 90 days to comment. DOE shall consider and publish the comments before finalizing the two inventories.

At each site at which DOE has generated or has stored mixed waste, DOE will then develop a *PLAN* for developing treatment technologies for treating the inventory wastes where no treatment exists and also for developing more treatment capacities where technologies are available. DOE will submit the plan to either EPA or the State.

Upon approval of the plan, EPA or the delegated state shall issue an *Order or permit* requiring compliance with the approved plan.

In the FFCA, Congress further instructed EPA to create new regulations for munitions within 24 months of April 6, 1992. The Office of Solid Waste has convened a workgroup to address the munitions requirements, and the workgroup has met with representatives from the Department of Defense.

Q. 29: A good example of EPA's lack of adequate resources is its approach to implementing plans for addressing pollution. The agency believes that nonpoint sources of pollution resulting from agriculture and urban runoff are what account for our nation's water quality problems. EPA has a plan to deal with nonpoint pollution. However, the plan has gone basically unimplemented, mainly for want of adequate resources. Where else has this been a problem in the agency?

A. 29: As you know, all Federal departments and agencies—including all the offices and programs within the Environmental Protection Agency—are making extraordinary efforts to effectively manage necessarily limited resources in meeting its statutory and regulatory obligations. For example, at the Environmental Protection Agency, the risk-based and watershed protection approaches are being developed and refined to focus Congressionally appropriated resources on priority environmental problems identified at the National, state and sub-state levels. The risk-based and watershed approaches seek to focus efforts on the most serious environmental problems first. The watershed protection approach seeks to identify priority pollution problems in a discrete geographic area and to then concentrate available Federal, state, local government, and private resources to address the problems.

Q. 30: A) Will you make it a priority to address the needs and concerns of small governments when developing these alternative approaches? (Refers to Administrator's statement in confirmation hearing that there was a need to move away from prescriptive "command and control" regulation toward alternative regulatory approaches)

A. 30: A) Yes, in many cases, achievement of our nation's environmental goals is dependent on implementation at the local government level, and the vast majority of these governments are small governments. So it is essential that their needs, concerns and ideas are carefully considered when we design and implement environmental programs. I am committed to forging the type of Federal, State and local government partnership that will ensure we all get the most bang for the buck and that environmental programs truly work at the local level where they matter most.

Q. 30: B) Will you keep the Reg-Flex policies and functions of the previous Administration in place?

A. 30: B) I strongly support the mandate of the Regulatory Flexibility Act of 1980: when developing regulations, Federal agencies must fully consider any significant

economic impacts on small businesses, small governments, and other small organizations. And I want EPA to be a leader in demonstrating that the Nation can achieve environmental quality goals while benefiting the economy. This inherently includes minimizing adverse economic impacts of regulations on small business and small governments. As I mentioned previously, one of my goals is to build partnerships that succeed in designing and implementing environmental programs that are effective and efficient in use of resources.

In April, 1992, my predecessor adopted new agency guidelines for implementing the Regulatory Flexibility Act. These guidelines actually go beyond the minimum requirements of the Regulatory Flexibility Act. The Act requires consideration of regulatory alternatives only if the Agency believes there would be a "significant impact on a substantial number" of small entities. In contrast, with new environmental statutes, we will consider regulatory alternatives if there would be *any* impact on *any* small entity. I support this approach, because I believe it will help us find the most cost effective means of achieving the Nation's environmental goals.

The career staff of the Agency have proposed a series of "pilot projects" for assisting in implementing these new reflex guidelines. There are two especially important objectives of the pilot effort: (1) demonstrate efficient means of developing regulatory alternatives which minimize adverse economic impacts on small entities while accomplishing environmental goals and objectives; and, (2) identify innovative ways to effectively involve small entities in the rulemakings which affect them. I strongly agree with these objectives. Additionally, I support the pilot project effort because I believe it will help illuminate how we can be even more effective in achieving the spirit and intent of the Reflex Act.

Q. 30: C) Will you build on them? How?

A. 30: C) In coming weeks, I will be reviewing issues related to both regulatory flexibility and our relations with small governments. And as indicated above, I will carefully follow the progress of the Reflex Pilot Projects. These reviews will enable me to formulate long term policies and programs for ensuring successful environmental programs in partnership with state and local governments and the private sector.

Q. 31: A) Is this [the use of the industry market-basket survey in determining the extent of dietary health risk and therefore in deciding which uses could be retained] the way that EPA normally makes such decisions?

A. 31: A) Yes, the EBDC decision is wholly consistent with the manner in which EPA makes its regulatory decisions regarding pesticides. EPA bases its decisions on the best scientific evidence available to the Agency, considering both the risks and the benefits of a pesticide, as mandated by the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).

By way of background, under FIFRA, EPA registers pesticides on the basis of data adequate to demonstrate that their use will not pose unreasonable risks to public health or the environment. When evidence is raised which calls into question the safety of a registered pesticide, EPA may initiate a process to determine if cancellation or some other regulatory action is warranted. FIFRA requires that the Agency's regulatory decision be based upon a consideration of both the potential risks and the benefits of a pesticide's use. The Agency's action on the EBDCs, therefore, came after careful consideration of both the risks and the benefits of these pesticides.

To arrive at its final decision on the EBDCs, EPA conducted a Special Review of these pesticides. Special Review is a public administrative review process by which the risks of a pesticide are weighed against its benefits to determine the appropriate regulatory action.

As part of a Special Review, a Preliminary Determination is often issued long before issuance of a Final Determination. The intent of a Preliminary Determination is to publicly announce the Agency's position, based upon available data. At this stage, among other actions the Agency may take, EPA may do the following: 1) describe the available data and the conclusions it would reach based upon those data alone; 2) identify additional data needed to refine the assessment; 3) request comment. Comments can often be accompanied by additional data. A Final Determination can differ significantly from a Preliminary Determination if data received in the interim substantially alters the balance of the pesticide's risks and benefits.

EPA's Final Determination on the EBDCs in 1992 differed significantly from the action proposed in the Preliminary Determination in 1989, because the final action was based upon additional data submitted in response to the Preliminary Determination, as well as a revised estimate of the toxicity of the EBDCs. Changes in information between the Preliminary Determination and the Final Determination included the following:

- "Market Basket Survey" data, indicating the concentrations of EBDCs that are found in food in the grocery store, rather than at the time of harvest.
- A revised cancer potency factor, as recommended by the Scientific Advisory Panel (SAP), EPA's panel of independent scientific experts.
- Additional benefits and residue data from grower groups.
- Additional data on worker exposure, including data submitted by the registrant on dermal exposure and dermal absorption.

Following is a more detailed discussion of each of these areas in which data were improved:

Market Basket Survey. At the time of the Preliminary Determination, the Agency indicated that actual residues of the EBDCs might be significantly lower if the food samples for residue studies were taken closer to the "dinner plate" than the "farm gate." Therefore, pursuant to its authority under Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) the Agency required the registrants to generate market basket data to determine the levels of EBDC residues in marketplace produce.

Before the market basket survey data were available, EPA based its risk assessment upon residue levels found in field residue trials. Field residue trials are designed to measure the highest residue resulting from the most extreme use pattern on the label. Their primary function is for use in setting tolerances (maximum legal pesticide residue levels). Most pesticide residues resulting from registered uses will be well below the tolerance level.

The market basket survey was the largest of its kind ever conducted, reflecting analysis of almost 6,000 food samples. In fact, the number of analyses performed in the survey rivals the FDA and CDFA (California Department of Food and Agriculture) surveillance monitoring programs. The survey cost the registrants about \$10 million. As expected, the market-basket findings indicated that, in general, the EBDC residues in foods on the grocery shelves were much lower than the field trial data indicated. These new residue data were used to refine the preliminary residue estimates.

Cancer Potency Factor. In addition to updating the dietary and occupational/residential exposure estimates, the Agency reevaluated the cancer potency factor (referred to as the Q_1^* —read "Q Star") for the Final Determination, based on further analysis of animal laboratory data on ETU, the breakdown product of the EBDCs. The cancer potency factor is a measure of a chemical's potential to induce cancer and is used in conjunction with the dietary and worker exposure to estimate risk.

Because the Q_1^* resulting from EPA's reevaluation would have been significantly lower than the preliminary Q_1^* used in the Preliminary Determination, and because Agency scientists were divided on the scientific issues, EPA returned to the SAP in September 1991. As a result of OPP's Health Effects Division Peer Review Committee decisions and the recommendations of the SAP, the Agency included in its analysis data from a low-dose group that had been analyzed previously. This low-dose group of animals were fed ETU levels closer to those that might actually be consumed by people. The effect of including these data was to lower the cancer potency factor for the Final Determination from $0.60 \text{ (mg/kg/day)}^{-1}$ to $0.11 \text{ (mg/kg/day)}^{-1}$.

Data from Growers. Grower groups also played an important role in providing information for the Final Determination for the EBDCs. By the fall of 1990, more than 300 comments had been received including benefits information and residue data from various grower organizations. For example, Hawaiian papaya growers described the limitations of chlorothalonil (the EBDC alternative for papayas) on papayas grown in Hawaii. Without such information, the Agency could have underestimated the benefits of EBDCs for papaya cultivation in Hawaii. The residue information provided by the growers was mainly used to corroborate the results of the market basket survey. The International Apple Institute however, provided residue data from an altered use pattern that was used as a primary source of data. Without these data, it is likely that the Agency would have pursued cancellation of the use of EBDCs on apples. Instead, the use of EBDCs on apples was retained, with an altered use pattern.

Worker Exposure. The Agency also revised its exposure estimates for people who handle EBDC products in a number of occupational or residential settings involving: agricultural and industrial applications, tank-mixing, commercial lawn applications, and homegardening. The new data for the revised worker exposure estimates include information received from commenters and data that were submitted by the registrants on dermal absorption and dermal exposure.

Q. 31: B) Do you consider EPA's reliance on the industry that they are responsible for regulating proper and objective?

A. 31: B) Yes. EPA generally bases its pesticide regulatory decisions upon data generated by pesticide registrants. Under FIFRA, registration applications must be accompanied by certain data submitted by registrants. Also, FIFRA has given EPA the authority under Section 3(c)(2)(B), at least since its amendment in 1978, to require pesticide registrants to generate and submit data in support of existing pesticide registrations.

It is clearly critical that the studies submitted in support of pesticide registrations be conducted in accordance with current scientific standards for integrity and quality. EPA has implemented a number of measures to assure the quality of pesticide data used by the Agency, including Good Laboratory Practice standards, the data review process, EPA's inspection and audit programs, and EPA's enforcement options. These are all described in the informational bulletin titled, "Ensuring the Quality of Studies Submitted to EPA in Support of Pesticide Registration."

EPA's Office of Compliance Monitoring audited every one of the four laboratories that generated data for the EBDC market basket survey, as well as the contracting firm responsible for managing the conduct of the study. The EBDC Task Force who contracted for this study brought to EPA's attention alleged improprieties at Craven Laboratories, one of the laboratories performing residue analysis for the survey. A joint investigation conducted by the Department of Justice, the U.S. Attorney's office and the EPA led to the indictment by a Federal grand jury of Craven Laboratories, Inc., its President, and three employees on 20 felony counts in connection with pesticide testing. Several Craven employees have admitted to wrong-doing and the matter is nearing the trial stage. Where requested by EPA, the EBDC Task Force replaced the data generated by Craven Laboratories for the EBDC survey.

EPA's audits confirmed that the data used in the final results of the market basket survey met scientific standards for integrity and quality. EPA was further able to verify the market basket data by comparison with data available from other sources. In addition to the registrant's market basket study, EPA reviewed monitoring data from FDA and the States, and studies from other interested parties, such as monitoring data from the National Food Processor's Association and commercial processing studies. All supported the results of the market basket survey.

Q. 31: C) Are there deficiencies in the way the human health concerns about EBDCs have been handled by EPA, and, if so, do these deficiencies apply to other pesticides decisions EPA has made where concerns about human health or the environment were at stake?

A. 31: C) No. The EBDC decision followed the most extensive review, analysis and assessment of data ever undertaken on any pesticide or class of pesticides. Because of this rigorous analysis, EPA is confident that the risk reduction measures implemented—decreased application rates, reduced number of applications on a crop, and longer intervals between the last EBDC treatment and harvesting the crop, as well as the cancellation of certain uses—are protective of public health.

Q. 32: EPA has an important role, but no statutory authority, in setting standards for exposure to and cleanup of radionuclides. A process is actually now underway (involving the Office of Radiation and Indoor Air) for EPA to be a major player in this effort. Do you support this process and how can we be assured of its completion?

A. 32: EPA has statutory authority under a number of statutes to set exposure standards for the cleanup of sites contaminated with radiation and the protection of drinking water. The Atomic Energy Act, the Comprehensive Environmental Response, Compensation, and Liability Act, the Toxic Substances Control Act, and the Resource Conservation and Recovery Act each give the Agency authority, although each statute excludes some radionuclides or some radioactively contaminated sites. The Agency is currently considering which statute, or combination of statutes, can best be applied to developing cleanup regulations. The Office of Air and Radiation is taking the lead in developing radiation cleanup standards, including:

Regulatory Development Efforts

- Regulations are being developed which will set forth cleanup procedures and criteria, including residual radioactivity levels.
- Waste management regulations are also being developed and will address the disposal and recycle of radioactively contaminated waste resulting from clean-up.
- EPA is participating in the NRC's participatory rulemaking workshops for the development of their Decommissioning rulemaking. NRC can be exempted from the EPA regulation if EPA concludes that the NRC regulation provides a sufficient level of protection for the public health and environment.
- EPA is chairing a high-level Interagency Steering Committee to address coordination of effort in the cleanup of radioactively contaminated sites. This commit-

tee was proposed by the Office of Management and Budget to address this multi-agency issue. In addition to EPA, the committee consists of representatives from the Departments of Defense and Energy and the Nuclear Regulatory Commission (NRC).

Atomic Energy Act Federal Guidance

—EPA chairs the committee on the development of Federal Guidance governing radiation issues. Once the committee issues its guidance, all Federal Agencies must implement them.

—This committee is actively pursuing the revision of existing Federal radiation protection guidance for the general public, including technical and policy issues relevant to radiation cleanup.

I strongly support all of these initiatives. Cabinet status of the EPA would greatly improve the Agency's ability to respond to this important public health and environmental issue in a cost effective and timely manner.

Q. 33: A) Which Federal agency—EPA or the Corps—has final authority to determine whether dredging and disposal projects are "environmentally acceptable"?

A. 33: A) The determination of environmental acceptability of dredging and disposal projects is made by a number of Federal and State agencies, depending in part on the nature of the activity, in what waters it occurs, and at what point one is in the decisionmaking process.

In most cases, dredging projects involve a discharge of dredged material into waters of the United States or into ocean waters. When such a discharge is involved (including the runoff or overflow from a contained land or water disposal site), the Corps is the permitting authority,¹ and makes a determination with the input of Federal agencies, State agencies, and the general public through the Public Notice process. If EPA disagrees with the Corps, EPA retains the ultimate authority, pursuant to Section 404(c) of the Clean Water Act (CWA) for waters of the U.S., or pursuant to Section 103 of the Marine Protection Research, and Sanctuaries Act (MPRSA) for ocean waters, to determine the acceptability of environmental impacts of the discharge on certain aquatic resources.

Dredging projects that do not subsequently involve a discharge of dredged material into waters of the United States are not subject to Section 404, but are subject to Section 10 of the Rivers and Harbors Act. The Corps makes the final determination of acceptability when an activity is governed only by Section 10, subject to the paragraphs below.

Pursuant to CWA Section 401, the States provide water quality certification for federally permitted or licensed (or conducted) dredging activities under CWA Section 404 and River and Harbors Act Section 10. Both authorities are subject to CWA Section 401 review including State water quality standards adopted pursuant to CWA Section 303(c), other CWA requirements, and appropriate requirements of State law.

EPA also reviews required environmental impact documentation prepared for Corps regulatory decisions and Civil Works dredging and disposal projects, pursuant to NEPA. At present, if EPA determines that a decision is "environmentally unacceptable," the Agency may elevate the issue to the President's Council of Environmental Quality.

Q. 33: B) Are Federal agencies, such as the Corps, under an obligation to carry out their actions in compliance with Federal water quality standards? Is the same true for EPA-approved State water quality standards? If these two types of standards are treated differently, what is the legal authority or other justification?

A. 33: B) Federal agencies, such as the Corps, are under an obligation to carry out their actions in compliance with both types of these standards. A Federal water quality standard is promulgated when a State fails to promulgate adequate water quality standards of their own.

In the case of the CWA, Section 301(b)(1)(C) requires Corps compliance with federally promulgated water quality standards in the issuance of permits to the same extent as for EPA-approved State water quality standards.² This requirement is contained in the Corps' regulations as well. In the case of the Marine Protection, Research, and Sanctuaries Act (MPRSA), Section 102 prohibits dumping which would

¹ Note that for Corps Civil Works navigation and maintenance projects (as opposed to regulatory review of other proposed discharges), the Corps of Engineers conducts the equivalent of the CWA Section 404(b)(1) Guidelines or MPRSA § 103 analysis to determine environmental impacts, even though they do not issue themselves a permit.

² The most recent Federal promulgation of water quality standards was for toxic pollutants in 14 States (see 57 FR 60848, December 22, 1992).

violate applicable water quality standards and does not distinguish between federally promulgated or state water quality standards.

Pursuant to CWA Section 304(a), EPA issues Federal water quality criteria to be used by the States. States use this guidance and other information to adopt criteria into State law to support designated uses. The criteria and designated uses are adopted as water quality *standards* subject to EPA review and approval. The Corps obtains State Section 401 certification (or waiver) for Corps-permitted (or conducted) activities which may involve a discharge to a State's waters. In addition, as part of demonstrating compliance with the CWA or the MPRSA, the activity regulated or conducted by the Corps is required to meet applicable State water quality standards.

Q. 33: C) Must any Corps determination of its "least costly and environmentally acceptable" Federal standard embody from the outset the minimum of environmental acceptability defined by compliance with Federal and EPA-approved State water quality standards? Please explain.

A. 33: C) Yes, the Corps' concept of "environmental acceptability" embodied in their Federal Standard includes compliance with State water quality standards. Likewise, compliance with the CWA Section 404(b)(1) Guidelines or MPRSA regulations for dumping in ocean waters, is a requirement for "environmental acceptability." Projects that do not comply with State water quality standards, or the Section 404(b)(1) Guidelines or MPRSA regulations, are not consistent with the Federal Standard.

Q. 33: D) What happens in the case such as at the Port of Toledo where an EPA-approved State water quality standard is interpreted differently by the Corps than by the State? Does EPA have a position on which entity—the Corps or the State—has the ultimate authority to interpret a State's water quality standards as they may relate to a Corps navigational dredging and disposal project?

A. 33: D) Where a State has an EPA-approved water quality standard, the State has the authority to "interpret" that standard. In the case of the Port of Toledo, the disagreement between the Corps and the State (and EPA which supports the State) concerns the "validity" of a narrative standard. Narrative standards are valid and authorized in 40 CFR 131.11. Therefore, Section 401 certifications relying on narrative water quality standards are valid.³

Q. 33: E) What, if any, recourse does the Corps have if it considers an EPA-approved State water quality standard—that may constrain its dredging and disposal options—excessive?

A. 33: E) As previously discussed, the Corps must comply with State water quality standards, regardless of whether or not the Corps considers them "excessive." If a State requests conditions addressing chemical, physical, or biological water quality concerns, on a Federal project that would result in the Corps carrying out the project in excess of their Federal Standard (i.e., conducting a project that costs more than another environmentally acceptable alternative), the Corps would not honor the State's request, because they would believe it violates their regulations. There are several courses a project could take if the Corps and a State disagree: (1) a local sponsor could pay the increased costs associated with a project, to carry out that alternative; (2) the Corps could pay certain additional costs with other funds, if these are available; (3) the Corps could modify their calculation of the least cost, environmentally acceptable alternative to incorporate compliance with State water quality standards as interpreted by the State; or (4) Congress could appropriate additional funds to conduct the project in a specific manner.

If the Corps cannot comply with conditions requested by the State, there are several additional courses a project could take: (1) the Corps could refuse to conduct the project; (2) the State could waive its certification (or grant a variance under State procedures) for the project to allow it to proceed; or (3) in the case of the CWA 404 regulated activities, the Corps could invoke authority under CWA Section 404(t) to maintain navigation, in spite of State requirements (to our knowledge, this authority—which we regard as emergency—has never been exercised).

Q. 33: F) Are EPA-approved State water quality standards somehow different from Federal water quality standards such that Federal agencies can selectively refuse to pay specific costs associated with EPA-approved State water quality standards?

³ We understand that the Corps believes that they are complying with all of the State of Ohio's standards and that the State of Ohio does not have a valid standard in place concerning the goal of eliminating all open-water disposal of dredged material. This goal is part of the State of Ohio's Phosphorus Reduction Strategy, which is contained in the narrative portion of the water quality standards.

A. 33: F) No. (see response to Question B which discusses the difference between EPA-approved State water quality standards and Federally promulgated water quality standards) Federal agencies cannot selectively refuse to comply with portions of a standard due to cost, but must comply with the entire standard, whether State or federally promulgated.

Q. 34: What thoughts do you have on the Great Lakes Sediment Control Act of 1993?

A. 34: In general, EPA supports the goals and objectives of the Great Lakes Sediment Control Act (GLSCA). Many of the activities mandated by the proposed GLSCA are already underway in response to mandates of the National Environmental Policy Act (NEPA) and Section 404 of the Federal Water Pollution Control Act (FWPCA), and through less formal mechanisms. As such, the GLSCA complements the direction and goals of our Great Lakes programs. However, the Agency is concerned that the mandates of the GLSCA will require extensive resources which the Act does not provide, and will in many cases, require timeframes beyond those specified. In particular, those mandates concerning the development of sediment disposal guidance and the management of confined disposal facilities on the Great Lakes cannot realistically be completed by the December 31, 1994, deadline imposed by the GLSCA. In addition, while we consider existing confined disposal facilities to be worthy of the type of attention outlined in the bill, we also believe that they pose much less of a risk to the environment than the large amount of unconfined contaminated sediments that are currently in place in the Great Lakes system. If the impact of the bill is to divert limited resources from in place contaminated sediment remediation to confined disposal facility certification, the Great Lakes environment will suffer.

EPA is not opposed to concurrence authority on matters of sediment management, but wishes to note that the Corps of Engineers currently seeks EPA input and concurrence on most such matters in the Great Lakes. In addition, the imposition of EPA concurrence authority for sediment management matters in the Great Lakes Basin, but not for such matters in other waters of the United States, may lead to significant variations in the government's response to such matters.

We wish to note one area of potential confusion in the GLSCA. Subsection 2(A) of Section (n) Sediment Load Reduction, implies that the Administrator of EPA shall award grants to achieve such reductions under authority of Section 319 of the FWPCA. However, Subsection 4(A) of Section (n) implies that the Secretary of the Army will award such grants with EPA concurrence. Only EPA is authorized to award Section 319 grants.

Q. 35: What are your views on the Great Lakes Federal Effectiveness Act which would create a Great Lakes Research Council to coordinate research among Federal agencies?

A. 35: Research into the ecological processes of the Great Lakes is critical to both our understanding of the Great Lakes and to our efforts to protect and restore these unique resources. However, EPA does not believe that the establishment of an additional committee under the auspices of the International Joint Commission will ensure the promotion of an ecosystem approach among the responsible Federal agencies. Rather, the Agency believes such a committee to be unnecessary. Scarce public resources can be better spent through directed research programs supporting ongoing U.S. regulatory efforts.

Q. 36: A) How would you organize and what priority would you give to geographically-targeted programs?

A. 36: A) Over the years, EPA has focused its efforts on technology-based control programs. While EPA has achieved a high level of success in controlling pollutants to waterbodies through this traditional technology-based approach, it has become apparent that other risks to ecosystems and human health exist which may be better addressed through geographically targeted efforts. Geographically-targeted programs, such as EPA's Great Water Body programs in the Great Lakes, Chesapeake Bay and the Gulf of Mexico; the National Estuary program; and smaller scale Clean Lakes; Near Coastal Waters, and other watershed projects have been very successful at refocussing attention on water resources in need of protection or restoration and tailoring solutions to these remaining needs. Often the larger-scale efforts have involved several Regions and States, requiring a cooperative team effort to their management. Experience-to-date suggests that these efforts, as well as ground water protection, should be managed from the "most local level" embracing an ecosystem protection approach, i.e., the Regions if Regional in scope, or State if intrastate. Experience has also taught us that there must be a clear lead or chairperson and staff support for these efforts. Based on our success with geographically-targeted efforts and our need to move to a more holistic approach to ecosystem pro-

tection to resolve our remaining problems, we are also promoting a Watershed Approach on a much broader-scale across the Nation as part of our ecosystem protection approach.

Q. 36: B) What role would you give to ecosystem research?

A. 36: B) Ecosystem research is a high priority. Watershed management and geographically-targeted programs are two very important approaches to achieving long-term protection of our nation's ecological resources. They incorporate the multimedia and biological system considerations that are essential in order to restore damaged resources and minimize future degradation. Research is critical for EPA's agency-wide ecosystems management initiatives and continuing efforts to develop biological criteria, new bioassessment protocols, and environmental indicators, which will significantly enhance the agency's ability to measure conditions of ecological resources and to make progress in meeting specific environmental goals. Other ecosystem research efforts currently underway include: ecotoxicology (which examines the effects of toxicants on both plants and animals); ecological restoration; ecological risk assessment and management; and environmental monitoring.

Q. 36: C) Would it be possible to better coordinate the work of other natural resource agencies, such as the Fish and Wildlife Service, NOAA, and the Army Corps of Engineers?

A. 36: C) Yes, it is possible to have better interagency coordination. This should be accomplished through all levels of communications and cooperation. We are doing several things to promote this. High-level management meetings involving these and other Federal agencies on an ongoing basis are helping to improve coordination and consistency and particularly helpful in resolving environmental disputes which cross jurisdictional lines. For instance, I now meet personally on a monthly basis with the Secretary of the Department of the Interior, the Department of Agriculture, and the Department of Energy, to foster this type of collaboration, and our respective staff meet weekly.

Interagency cooperation/collaboration can be further expanded in efforts such as joint regulatory responsibilities, mutual science and research projects, information management systems and data sharing, monitoring and assessment strategies, and other opportunities. EPA participates in interagency efforts for ecological protection in leadership capacities, as equal partners, or simply in a supportive role. Interagency partnerships are also well suited for implementation at the regional office level, and are occurring in all EPA regions.

Memoranda of Understanding (MOUs), like the one signed between my predecessor William Reilly and John Turner of the Fish and Wildlife Service, and long-term personnel exchange programs involving relevant agencies also enhance agency cooperation and should be pursued. Other programs like EPA's Environmental Monitoring and Assessment Program (EMAP) maintains more than 20 MOU's and Interagency Agreements (IAGs) with 12 Federal Agencies. Additionally, conferences like Watershed '93, which was sponsored by EPA and 13 other Federal agencies, will improve coordination. Other examples include the National Estuary Program, which involves interagency coordination to address priority problems in our Nation's estuaries. In the dredge material management programs, the EPA and Army Corps of Engineers are working closely together on several technical guidances and a strategy to address management of dioxin-contaminated dredged materials.

Q. 37: A recent National Law Journal study, released on September 21, 1992, reported that superfund cleanup activity began from 12 percent to 42 percent later at minority sites for over half of the ten autonomous regions. How does Region 5 compare with those statistics and what other comments do you have on this matter?

A. 37: The National Law Journal (NLJ) reported that in six of EPA's ten regions, the pace of EPA action from discovery of the site to the beginning of cleanup is from eight percent to 42 percent faster at white sites than at minority sites. The NLJ found that in one EPA region, the pace of cleanup for minority and white sites was even, and that in three Regions, the cleanup began more quickly at minority sites. For Region 5, the NLJ found the pace of cleanup from discovery to cleanup was 13.8 years for minority sites compared to 9.7 years for white sites (42 percent longer at minority sites.)

There are several methodological flaws in the NLJ's work that call into question these results. For example, the NLJ relied on the ZIP codes as a surrogate for location to determine the demographics around a site. In some cases, ZIP codes represent a mailing address but not the actual location of a site. Another example is the use by the NLJ of discovery dates that were well before the Superfund law was passed and therefore before Superfund action was possible. Also, the NLJ did not look at other site variables that affect cleanup decisions such as type of site.

It is important to note that these flaws in the NLJ analysis do not completely explain why the NLJ found cleanup activities take longer at minority sites in some regions. The NLJ has raised an important issue that needs to be examined carefully. For this reason, EPA is making a serious commitment to determine whether racial inequities exist in the Superfund program. We are using the most current and reliable data available to study the demography around Superfund sites, and comparing these data with the historic performance of the Superfund program. By this summer, we plan to link minority status with site variables such as time from discovery to first removal activity, and type of remedy selected to determine whether there are biases in the program.

In addition, the Agency is taking a proactive approach to equity by providing site decision makers with demographic information early in the site identification process. We believe that getting this information out early will provide opportunities for EPA to improve communication with members of minority communities.

Q. 38: What environmental equity strategies are being developed for the Great Lakes region by the Office of Environmental Equity?

A. 38: The Office of Environmental Equity is particularly concerned with the health effects on minority and low-income human populations resulting from the consumption of contaminated fish. In particular, American Indians, African Americans, and Asian Americans are believed to be at risk due to their high subsistence and cultural fish consumption rates. In addition, fetuses and nursing infants of mothers who consume contaminated Great Lakes fish are believed to be at risk. The Office of Environmental Equity is addressing equity concerns by coordinating with the Agency for Toxic Substances and Disease Registry's (ATSDR) Great Lakes Human Health Effects Research Program. The goal of this program is to:

- 1) Identify human populations residing in the Great Lakes Basin who may be at significantly increased risk of adverse health effects due to higher consumption rates of fish contaminated with pollutants from the Great Lakes and to prevent unreasonable risk of health effects. The Office of Environmental Equity is coordinating its involvement with EPA's Office of Water, Region 5 offices, and the Great Lakes National Program Office.
- 2) Enhance training and awareness of Federal, Tribal, State and local officials dealing with minority and low-income populations believed to be at significantly increased risk of adverse health effects due to their high subsistence fish consumption rates;
- 3) Support the collection of demographic and research data which identifies the populations at significantly increased risk and documents the risk and severity of different adverse health effects;
- 4) Encourage the dissemination of outreach materials, public notices and public hearings in multiple languages, as appropriate, to make information more accessible to non-English speaking populations living in the Great Lakes Region;
- 5) Review and monitor all reports from the Great Lakes Program involving evidence of potentially increased health risks to special populations;
- 6) Provide consultation to the Great Lakes staff on equity matters.

Q. 39: Under Superfund, how are submerged sites treated in the hazard ranking system? How many submerged sites are currently on the National Priority List?

A. 39: The evaluation of sediment contamination at Superfund sites is an area that has received increasing attention as public concerns, health impacts, costs, and challenges of remediation have evolved. The original Hazard Ranking System (HRS) [the primary tool used to support the placement of sites on to the NPL] did not explicitly evaluate contaminated sediments. However, surface water contamination was evaluated and sites with contaminated sediments could be scored under the surface water pathway. In revising the HRS, the EPA has made the evaluation of contaminated sediments more explicit in the following ways:

- Sediments are evaluated to determine if contaminant levels are above background. If concentrations exceed background levels, additional points are assigned in the site scoring.
- Sites that show contamination levels above background levels are also evaluated to determine if concentrations exceed levels that exceed risk/regulation based cleanup goals. These goals include cancer and non-cancer risks.
- Chemicals that have a tendency to bioaccumulate receive additional points within the HRS scoring process.

The first two bullets reflect evaluation processes that are consistent with the evaluations that are performed for all pathways in HRS scoring. The consideration of bioaccumulation is also provided for the surface water pathway evaluations as they evaluate water contamination. Thus, the revised HRS provides explicit consideration for the evaluation of contaminated sediments. The evaluation of contaminated

surface water is an area that has received considerable attention during the revisions to the HRS. Results from the scoring of field test sites indicate that the current HRS should provide slightly more points to sites with surface water contamination than did the original HRS. The pathway is divided into the Drinking Water, Food Chain, and Environmental threats. Thus between the changes to the HRS in the area of surface water and contaminated sediments, sites with either surface water contamination or contaminated sediments should receive higher scores.

Over 90 percent of the sites scored with the original HRS are adjacent to surface water bodies. Less than half of the sites scored with the revised HRS were identified through the scoring of sites. It is reasonable to expect that scoring for the surface water path way would lead to an underestimate of sites near surface water because pathways are not likely to be scored unless data is available and scoring is expected to lead to a noticeable contribution to the overall site score.

There are also a group of sites that have been associated with radioactive waste in the ocean. Several of these sites have received repeated attention. These sites include the Farallon Islands, which is over a 100 miles off the California coast from San Francisco, and several sites off the East Coast.

Q. 40: Last year, I introduced legislation (S.3336) to establish a pilot program for the government to acquire and demonstrate the use of products made from recovered materials in the construction and retrofitting of Federal buildings. What thoughts do you have on how to best make this a successful pilot program? Will you work with the Committee to help craft and implement this proposal?

A. 40: EPA believes that its current Design and Construction Program serves as a model for acquiring and demonstrating the use of products made from recovered materials. All newly constructed EPA facilities not only require use of recycled products through Agency procurement policy, but also utilize other pollution prevention initiatives, such as water conservation, and energy conservation features utilizing a "green lights" approach.

EPA would be delighted to work with the Committee to help craft and implement this proposal.

Q. 41: Ms. Browner, in October, 1992, GAO reported to this Committee on the status of efforts to protect workers from asbestos hazards. Some of its conclusions included the fact that no single agency is responsible for maintaining information on asbestos materials in buildings, no agency surveyed was fully implementing either the EPA's recommendations for managing asbestos or OSHA's requirements for protecting against potentially harmful exposure, and only two of the agencies visited have issued guidance to worksite managers informing them of what actions to take to manage asbestos. Would you comment on the status of EPA's efforts to improve this situation and what you will do to help ensure that workers are adequately protected against potentially harmful exposure?

A. 41: EPA continues its strong support of programs helping to ensure that workers are adequately protected against potentially harmful exposure to asbestos fibers. Some of that support is in the form of guidance documents and recommendations; other support comes through regulation. EPA staff meet regularly with other Federal agencies at meetings such as the Federal Asbestos Task Force (FATF) and the Asbestos Design and Development Initiatives Group (ADDIG). New EPA regulations and guidance materials are discussed.

1. OSHA has primary responsibility for regulations applicable to employee exposure in the workplace. However, because OSHA lacks jurisdiction over workers in the public sector, under the *EPA Asbestos Worker Protection Rule (WPR)*, EPA extends coverage comparable to that of the OSHA asbestos standards to State and local government (public sector) workers in 27 states. (Twenty-three states and jurisdictions operating OSHA-approved state plans cover both public and private sector workers and two states cover public employees only.)

The current (1987) EPA WPR provides worker protection coverage only for asbestos abatement projects. A revision of the WPR, now undergoing Agency review, will extend all of the coverage provided under the OSHA Asbestos Standard for the Construction Industry to all public sector workers in the 27 states covered by the EPA WPR. Protection will be provided for all "construction work activities," including building operations and maintenance, repair, renovation, demolition, and removal work, where asbestos is encountered in the workplace.

Also, EPA's revised *Model Accreditation Plan (MAP)* will extend training and accreditation requirements to workers and others who are not now required to have extended training.

2. EPA provided financial support and staff oversight to the National Institute of Building Sciences (NIBS) in their development and publication (September 1992) of a new guidance manual. The NIBS *Asbestos Operations & Maintenance (O&M) Work*

Practices manual is a practical supplement to the Agency's 1990 guidance manual, "Managing Asbestos in Place" (the Green Book). With the guidance provided to building asbestos program managers and workers, and with the detailed, specific, and appropriate work practices for asbestos O&M workers that are set forth in the new manual, EPA believes this represents another major step forward in worker protection.

3. EPA has increased its communication with OSHA to help coordinate issues of mutual concern to both agencies as OSHA works to revise their asbestos worker protection regulations. We anticipate publication of OSHA's revised standards sometime this summer.

Q. 42: I'm interested in your thoughts on how the EPA can better address environmental problems on Indian reservations. Would you agree that a major problem is that more resources need to be targeted for enforcement and technical assistance on reservations?

What percentage of the EPA's funding and staff are targeted on Indian Tribes?

A. 42: EPA currently provides resources for environmental protection on Indian lands in three ways. First, it provides resources through Congressional appropriations and set-asides such as those provided under Section 319 and Title VI of the Clean Water Act (CWA) and funds appropriated in support of the multimedia/general assistance program. Second, EPA provides resources through regulatory set-asides such as the up to 3 percent of CWA Section 106 funds that are set-aside under that Act's Indian Program regulations. Finally, individual EPA offices review their grant funds on a yearly basis and include tribes along with states within their discretionary programs.

Currently, 100 percent of EPA's multi-media/general assistance funds go to tribes. Other program funding directed to tribes include: about 2-3 percent of the funds for state, local and tribal programs, about 0.9 percent of the Agency's Superfund monies, and 0.5 percent of the wastewater treatment construction funds are reserved for tribes. Approximately 0.7 percent of EPA's work effort is devoted to the Indian Program. EPA has increased its support of tribal programs by over 600 percent since the adoption of its Indian Policy. As tribes continue to develop their capacity to participate in EPA programs, the Agency will need to continue to increase its efforts to support the development of tribal regulatory systems.

Q. 43: In light of the magnitude of environmental problems in Indian country, would you have a recommendation for an appropriate policy position to address them if the EPA becomes a Department?

A. 43: In 1984, EPA was the first Federal agency outside of the Bureau of Indian Affairs and the Indian Health Service to adopt an Indian Policy. The Agency's policy recognizes the sovereignty of tribal governments and its trust responsibility to tribes and commits EPA to working with tribal governments on a government-to-government basis. If EPA becomes a department, these basic foundations of the Agency's Indian Policy will be the cornerstones of any Departmental approach which the Agency will take in the conduct of its affairs with Indian nations.

Q. 44: Do you feel that Natives Americans deserve a voice and a strong advocate at the policy-making level of a new "Department of the Environment?"

A. 44: For the past several years EPA has had individuals in the role of Special Assistant to the Administrator who have advocated the inclusion of Indian tribes in all appropriate areas of the Agency's programs. If the Agency is elevated to Departmental status, this advocacy role will, along with other appropriate program areas, be reviewed to determine how it can best be institutionalized within the framework of the new Department. To facilitate the process of ensuring an Indian voice as the Agency implements its Indian Policy, and in support of the President's policy of having government reflect the essential character of the American people, the Agency will increase its efforts to recruit qualified tribal members to occupy positions at all levels within the Agency, including those that develop policy at its highest levels.

Q. 45: Isn't it both reasonable and necessary to have one of the ten Assistant Secretaries called for by this bill to be responsible solely for environmental policies and programs affecting Indian tribes and lands?

A. 45: The EPA Indian Program is an important function that cuts across all of the Agency's major programs to help protect human health and the environment. If the Agency is elevated to Department status, it will review its current structure and the legislative mandates of both its program-specific and cross-cutting functions to determine how to most effectively employ its human and financial resources to meet its statutory obligations.

Q. 46: The issue of what the economic costs and impacts of environmental regulations on the public and businesses is being increasingly debated. Can you inform

us how you will act to see that these concerns are properly evaluated by senior policy makers at a new Department of the Environment? Is this an issue of great importance to you?

A. 46: The issue is indeed of great importance to me and EPA. Since the passage of the Clean Air and Water Acts in the early 1970's, EPA has issued periodic reports on the economic costs of air and water pollution control expenditures. The most recent of these reports, entitled *Environmental Investments: The Cost of a Clean Environment*, was issued in late 1990, and updates are planned for future years. This report summarizes the pollution control costs in all media for which EPA has responsibility for both the public and private sectors. Since the 1970s, EPA has also prepared comprehensive economic cost and impact studies on each major regulation, as have most other Federal regulatory agencies. These reports are used by the Agency and other Federal agencies in evaluating most major proposed regulations before they are issued.

These efforts will be intensified under the new proposed Department of the Environment so as to assure that the costs and impacts of new proposed regulations are given the attention they deserve both before and after regulations are issued. I also plan to insist that these reports, once prepared, be given careful attention by senior Departmental policy makers to the extent allowed by law.

Although environmental pollution control regulations cannot be made cost-free, I can and will insist that the costs be held to the lowest levels consistent with the laws under which we operate and the protection of the environment. By preparing and using these reports at both the regulation level and the program level, I believe that the environment can be improved while not increasing the costs of environmental protection beyond the capability of our economy to pay them.

Q. 47: One area I believe you will need to watch very carefully is the environmental problems that exist at military bases in the U.S. that will be converted for civilian purposes. Do you have a plan to work with the Department of Defense to address environmental problems for the large number of military bases that will be closed in the next four years?

A. 47: Yes, EPA has a plan to work with DOD to address environmental problems at closing military bases. The plan is to: 1) define the Agency's mission relative to base closure; 2) define and build the type of organization/infrastructure to carry out the Agency's mission; and 3) address environmental issues associated with base closure. This response focuses on the mission and some of the steps taken to address the many issues associated with base closure.

The mission of EPA's base closure program was defined in 1991: to protect human health and the environment and return closing bases to safe and productive use as soon as possible. Fundamentally, most of the issues associated with accomplishing the mission can be distilled into two overriding interrelated problems: expediting property transfer and accelerating site cleanup. The following are only several of many actions that have been taken to address these issues:

EPA and DOD co-sponsored a series of conferences entitled, "Military Base Closure: Accelerating Environmental Restoration." The conferences served as forums for improving communication between DOD, EPA, states, local communities, and other interested parties to facilitate cleanup and redevelopment of closing bases and help resolve issues affecting the base closure process. Conference participants met to discuss acceleration initiatives, risk management, real estate and redevelopment, remediation technologies, and the development of standardized techniques relative to hazardous waste cleanups at closing military bases. The team approach, i.e., the close working relationship among the regulators and the installation project manager, was stressed throughout the conferences. The conferences demonstrated that by investing in a team approach, EPA, DOD, and the states can streamline and accelerate cleanup at closing bases.

EPA is working closely with DOD to develop procedures for identifying uncontaminated parcels at closing bases so that the parcels can be made available for reuse as quickly as possible. EPA is also working with DOD to establish procedures for the transfer of remediated parcels and leasing of contaminated parcels.

Finally, pursuant to the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, EPA reviews NEPA documents and provides comments to the Armed Service branches regarding the environmental affects associated with proposed base reuse and disposal.

Q. 48: President Clinton has promised a reduction of 100,000 jobs and a 14 percent cut in Administrative costs of Federal Departments and agencies. Can you comment on how you will achieve these reductions without compromising the integrity of environmental protection programs?

A. 48: The Clinton Administration's deficit reduction strategy is a long-term plan which will be implemented over a five year period, from fiscal year 1993-1998. In the short-term, EPA has taken its share of reductions equally across the board. In fiscal year 1994, EPA has limited spending in some areas, while focusing valuable resources toward critical environmental programs. Through these efforts, EPA will be able to attain the savings necessary for sound economic growth while securing a safe and healthy environment for future generations. In addition, EPA is currently in the early stages of planning a base program review of EPA activities. This review will help us compare resource expenditures with national environmental priorities, as a basis for future budgeting efforts.

Q. 27: Our Committee has scheduled a hearing on pollution liabilities and characterization problems throughout the Federal government. We are just beginning to learn the magnitude of the unknown universe of problems in every Federal agency. The Department of Interior, for example, has one of the largest environmental problems in terms of characterization and likely cost of cleanup in its Bureau of Land Management. The Department of Energy's environmental problems continue and grow in complexity and cost. What is EPA's and the new Department's role in helping other Federal agencies identify and begin efforts to remediate these problems?

A. 27: In order to assist Federal agencies in identifying environmental liabilities, and ensure a compliant and effective response to environmental problems, the Office of Federal Facilities Enforcement has begun building the Federal agency/EPA environmental partnership through a variety of both formal and informal mechanisms. These mechanisms provide Federal agencies with an opportunity to identify high priority environmental needs as well as an opportunity to demonstrate leadership among the regulated community.

Formal mechanisms include EPA's participation in a Memorandum of Understanding (MOU) with DOE, DOD and DOI and the Western Governors Association to establish a more cooperative approach to develop technical solutions to environmental remediation and waste management problems shared by states, commercial entities, and the Federal Government. The regional approach serves as a demonstration of principles and practices which may be adopted nationally.

Through informal mechanisms such as the Civilian Federal Agency Task Force, The Experts Work Group, and the Federal Remediation Technologies Roundtable, the Office of Federal Facilities Enforcement is working with Federal agencies in identifying deficiencies in Federal environmental management programs and clean-up efforts and forming workgroups consisting of EPA and Federal agency representatives to solve problems and meet high priority needs. In addition, EPA's OFFE convenes a monthly Federal Facility Policy Roundtable to brief Federal agencies and provide copies of new and imminent regulatory developments or other pertinent initiatives and programs that enhance agency compliance programs (e.g., environmental auditing and pollution prevention). EPA is also partnering with DOD and DOE on joint planning goals and to test innovative approaches to expedite cleanups including streamlining review of documents, test different decision making models, and test innovative technologies.

Future initiatives include the "Green Government" program intended to promote voluntary programs to improve environmental compliance through pollution prevention and encourage total quality environmental ("beyond compliance") management at Federal agencies. The Department of the Environment is the mandated agency to monitor and respond to Federal Agency environmental compliance activities and needs.

Q. 28: Last year the Congress finally enacted the Federal Facility Compliance Act (FFCA), which should strengthen EPA's hand in dealing with other agencies violations of RCRA and other environmental statutes. Could you comment on what the EPA is currently doing to implement this law and what future plans you have?

A. 28: The FFCA became law on October 6, 1992. This new Act only amends the Resource Conservation and Recovery Act (RCRA). There are several new authorities that will make RCRA Federal facility enforcement actions more consistent with actions currently used in the private sector.

The FFCA also requires the Administrator to undertake inspections at all Federal facilities that treat, store, and dispose of hazardous waste. EPA is determining the appropriate interpretation for this provision. On March 17, 1993 EPA sent out guidance regarding implementation of the new RCRA inspection requirements to the EPA Regions. In addition, EPA is also working on the appropriate mechanism for reimbursement of EPA by the Federal agencies for the cost of performing inspec-

tions. The RCRA Land Disposal Restrictions require treatment technologies and capacity be developed for mixed waste.

DOE, within 180 days of October 6, must submit two inventory reports: 1) a national inventory of all of its mixed wastes regardless of the time they were generated, on a state-by-state basis; and 2) a national inventory of its mixed waste treatment capacities and technologies. DOE has submitted these reports to EPA and the appropriate states. Both EPA and the states have 90 days to comment. DOE shall consider and publish the comments before finalizing the two inventories.

At each site at which DOE has generated or has stored mixed waste, DOE will then develop a *PLAN* for developing treatment technologies for treating the inventory wastes where no treatment exists and also for developing more treatment capacities where technologies are available. DOE will submit the plan to either EPA or the State.

Upon approval of the plan, EPA or the delegated state shall issue an *Order* or *permit* requiring compliance with the approved plan.

In the FFCA, Congress further instructed EPA to create new regulations for munitions within 24 months of April 6, 1992. The Office of Solid Waste has convened a workgroup to address the munitions requirements, and the workgroup has met with representatives from the Department of Defense.

Q. 29: A good example of EPA's lack of adequate resources is its approach to implementing plans for addressing pollution. The agency believes that nonpoint sources of pollution resulting from agriculture and urban runoff are what account for our nation's water quality problems. EPA has a plan to deal with nonpoint pollution. However, the plan has gone basically unimplemented, mainly for want of adequate resources. Where else has this been a problem in the agency?

A. 29: As you know, all Federal departments and agencies—including all the offices and programs within the Environmental Protection Agency—are making extraordinary efforts to effectively manage necessarily limited resources in meeting its statutory and regulatory obligations. For example, at the Environmental Protection Agency, the risk-based and watershed protection approaches are being developed and refined to focus Congressionally appropriated resources on priority environmental problems identified at the National, state and sub-state levels. The risk-based and watershed approaches seek to focus efforts on the most serious environmental problems first. The watershed protection approach seeks to identify priority pollution problems in a discrete geographic area and to then concentrate available Federal, state, local government, and private resources to address the problems.

Q. 30: A) Will you make it a priority to address the needs and concerns of small governments when developing these alternative approaches? (Refers to Administrator's statement in confirmation hearing that there was a need to move away from prescriptive "command and control" regulation toward alternative regulatory approaches)

A. 30: A) Yes, in many cases, achievement of our nation's environmental goals is dependent on implementation at the local government level, and the vast majority of these governments are small governments. So it is essential that their needs, concerns and ideas are carefully considered when we design and implement environmental programs. I am committed to forging the type of Federal, State and local government partnership that will ensure we all get the most bang for the buck and that environmental programs truly work at the local level where they matter most.

Q. 30: B) Will you keep the Reg-Flex policies and functions of the previous Administration in place?

A. 30: B) I strongly support the mandate of the Regulatory Flexibility Act of 1980: when developing regulations, Federal agencies must fully consider any significant economic impacts on small businesses, small governments, and other small organizations. And I want EPA to be a leader in demonstrating that the Nation can achieve environmental quality goals while benefiting the economy. This inherently includes minimizing adverse economic impacts of regulations on small business and small governments. As I mentioned previously, one of my goals is to build partnerships that succeed in designing and implementing environmental programs that are effective and efficient in use of resources.

In April, 1992, my predecessor adopted new agency guidelines for implementing the Regulatory Flexibility Act. These guidelines actually go beyond the minimum requirements of the Regulatory Flexibility Act. The Act requires consideration of regulatory alternatives only if the Agency believes there would be a "significant impact on a substantial number" of small entities. In contrast, with new environmental statutes, we will consider regulatory alternatives if there would be any impact on any small entity. I support this approach, because I believe it will help us find the most cost effective means of achieving the Nation's environmental goals.

The career staff of the Agency have proposed a series of "pilot projects" for assisting in implementing these new reflex guidelines. There are two especially important objectives of the pilot effort: (1) demonstrate efficient means of developing regulatory alternatives which minimize adverse economic impacts on small entities while accomplishing environmental goals and objectives; and, (2) identify innovative ways to effectively involve small entities in the rulemakings which affect them. I strongly agree with these objectives. Additionally, I support the pilot project effort because I believe it will help illuminate how we can be even more effective in achieving the spirit and intent of the Reflex Act.

Q. 30: C) Will you build on them? How?

A. 30: C) In coming weeks, I will be reviewing issues related to both regulatory flexibility and our relations with small governments. And as indicated above, I will carefully follow the progress of the Reflex Pilot Projects. These reviews will enable me to formulate long term policies and programs for ensuring successful environmental programs in partnership with state and local governments and the private sector.

Q. 31: A) Is this [the use of the industry market-basket survey in determining the extent of dietary health risk and therefore in deciding which uses could be retained] the way that EPA normally makes such decisions?

A. 31: A) Yes, the EBDC decision is wholly consistent with the manner in which EPA makes its regulatory decisions regarding pesticides. EPA bases its decisions on the best scientific evidence available to the Agency, considering both the risks and the benefits of a pesticide, as mandated by the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).

By way of background, under FIFRA, EPA registers pesticides on the basis of data adequate to demonstrate that their use will not pose unreasonable risks to public health or the environment. When evidence is raised which calls into question the safety of a registered pesticide, EPA may initiate a process to determine if cancellation or some other regulatory action is warranted. FIFRA requires that the Agency's regulatory decision be based upon a consideration of both the potential risks and the benefits of a pesticide's use. The Agency's action on the EBDCs, therefore, came after careful consideration of both the risks and the benefits of these pesticides.

To arrive at its final decision on the EBDCs, EPA conducted a Special Review of these pesticides. Special Review is a public administrative review process by which the risks of a pesticide are weighed against its benefits to determine the appropriate regulatory action.

As part of a Special Review, a Preliminary Determination is often issued long before issuance of a Final Determination. The intent of a Preliminary Determination is to publicly announce the Agency's position, based upon available data. At this stage, among other actions the Agency may take, EPA may do the following: 1) describe the available data and the conclusions it would reach based upon those data alone; 2) identify additional data needed to refine the assessment; 3) request comment. Comments can often be accompanied by additional data. A Final Determination can differ significantly from a Preliminary Determination if data received in the interim substantially alters the balance of the pesticide's risks and benefits.

EPA's Final Determination on the EBDCs in 1992 differed significantly from the action proposed in the Preliminary Determination in 1989, because the final action was based upon additional data submitted in response to the Preliminary Determination, as well as a revised estimate of the toxicity of the EBDCs. Changes in information between the Preliminary Determination and the Final Determination included the following:

- "Market Basket Survey" data, indicating the concentrations of EBDCs that are found in food in the grocery store, rather than at the time of harvest.
- A revised cancer potency factor, as recommended by the Scientific Advisory Panel (SAP), EPA's panel of independent scientific experts.
- Additional benefits and residue data from grower groups.
- Additional data on worker exposure, including data submitted by the registrant on dermal exposure and dermal absorption.

Following is a more detailed discussion of each of these areas in which data were improved:

Market Basket Survey. At the time of the Preliminary Determination, the Agency indicated that actual residues of the EBDCs might be significantly lower if the food samples for residue studies were taken closer to the "dinner plate" than the "farm gate." Therefore, pursuant to its authority under Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) the Agency required the registrants to gen-

erate market basket data to determine the levels of EBDC residues in marketplace produce.

Before the market basket survey data were available, EPA based its risk assessment upon residue levels found in field residue trials. Field residue trials are designed to measure the highest residue resulting from the most extreme use pattern on the label. Their primary function is for use in setting tolerances (maximum legal pesticide residue levels). Most pesticide residues resulting from registered uses will be well below the tolerance level.

The market basket survey was the largest of its kind ever conducted, reflecting analysis of almost 6,000 food samples. In fact, the number of analyses performed in the survey rivals the FDA and CDFA (California Department of Food and Agriculture) surveillance monitoring programs. The survey cost the registrants about \$10 million. As expected, the market-basket findings indicated that, in general, the EBDC residues in foods on the grocery shelves were much lower than the field trial data indicated. These new residue data were used to refine the preliminary residue estimates.

Cancer Potency Factor. In addition to updating the dietary and occupational/residential exposure estimates, the Agency reevaluated the cancer potency factor (referred to as the Q_1^* —read “Q Star”) for the Final Determination, based on further analysis of animal laboratory data on ETU, the breakdown product of the EBDCs. The cancer potency factor is a measure of a chemical’s potential to induce cancer and is used in conjunction with the dietary and worker exposure to estimate risk.

Because the Q_1^* resulting from EPA’s reevaluation would have been significantly lower than the preliminary Q_1^* used in the Preliminary Determination, and because Agency scientists were divided on the scientific issues, EPA returned to the SAP in September 1991. As a result of OPP’s Health Effects Division Peer Review Committee decisions and the recommendations of the SAP, the Agency included in its analysis data from a low-dose group that had been analyzed previously. This low-dose group of animals were fed ETU levels closer to those that might actually be consumed by people. The effect of including these data was to lower the cancer potency factor for the Final Determination from $0.60 \text{ (mg/kg/day)}^{-1}$ to $0.11 \text{ (mg/kg/day)}^{-1}$.

Data from Growers. Grower groups also played an important role in providing information for the Final Determination for the EBDCs. By the fall of 1990, more than 300 comments had been received including benefits information and residue data from various grower organizations. For example, Hawaiian papaya growers described the limitations of chlorothalonil (the EBDC alternative for papayas) on papayas grown in Hawaii. Without such information, the Agency could have underestimated the benefits of EBDCs for papaya cultivation in Hawaii. The residue information provided by the growers was mainly used to corroborate the results of the market basket survey. The International Apple Institute however, provided residue data from an altered use pattern that was used as a primary source of data. Without these data, it is likely that the Agency would have pursued cancellation of the use of EBDCs on apples. Instead, the use of EBDCs on apples was retained, with an altered use pattern.

Worker Exposure. The Agency also revised its exposure estimates for people who handle EBDC products in a number of occupational or residential settings involving: agricultural and industrial applications, tank-mixing, commercial lawn applications, and homegardening. The new data for the revised worker exposure estimates include information received from commenters and data that were submitted by the registrants on dermal absorption and dermal exposure.

Q. 31: B) Do you consider EPA’s reliance on the industry that they are responsible for regulating proper and objective?

A. 31: B) Yes. EPA generally bases its pesticide regulatory decisions upon data generated by pesticide registrants. Under FIFRA, registration applications must be accompanied by certain data submitted by registrants. Also, FIFRA has given EPA the authority under Section 3(c)(2)(B), at least since its amendment in 1978, to require pesticide registrants to generate and submit data in support of existing pesticide registrations.

It is clearly critical that the studies submitted in support of pesticide registrations be conducted in accordance with current scientific standards for integrity and quality. EPA has implemented a number of measures to assure the quality of pesticide data used by the Agency, including Good Laboratory Practice standards, the data review process, EPA’s inspection and audit programs, and EPA’s enforcement options. These are all described in the informational bulletin titled, “Ensuring the Quality of Studies Submitted to EPA in Support of Pesticide Registration.”

EPA’s Office of Compliance Monitoring audited every one of the four laboratories that generated data for the EBDC market basket survey, as well as the contracting

firm responsible for managing the conduct of the study. The EBDC Task Force who contracted for this study brought to EPA's attention alleged improprieties at Craven Laboratories, one of the laboratories performing residue analysis for the survey. A joint investigation conducted by the Department of Justice, the U.S. Attorney's office and the EPA led to the indictment by a Federal grand jury of Craven Laboratories, Inc., its President, and three employees on 20 felony counts in connection with pesticide testing. Several Craven employees have admitted to wrongdoing and the matter is nearing the trial stage. Where requested by EPA, the EBDC Task Force replaced the data generated by Craven Laboratories for the EBDC survey.

EPA's audits confirmed that the data used in the final results of the market basket survey met scientific standards for integrity and quality. EPA was further able to verify the market basket data by comparison with data available from other sources. In addition to the registrant's market basket study, EPA reviewed monitoring data from FDA and the States, and studies from other interested parties, such as monitoring data from the National Food Processor's Association and commercial processing studies. All supported the results of the market basket survey.

Q. 31: C) Are there deficiencies in the way the human health concerns about EBDCs have been handled by EPA, and, if so, do these deficiencies apply to other pesticides decisions EPA has made where concerns about human health or the environment were at stake?

A. 31: C) No. The EBDC decision followed the most extensive review, analysis and assessment of data ever undertaken on any pesticide or class of pesticides. Because of this rigorous analysis, EPA is confident that the risk reduction measures implemented—decreased application rates, reduced number of applications on a crop, and longer intervals between the last EBDC treatment and harvesting the crop, as well as the cancellation of certain uses—are protective of public health.

Q. 32: EPA has an important role, but no statutory authority, in setting standards for exposure to and cleanup of radionuclides. A process is actually now underway (involving the Office of Radiation and Indoor Air) for EPA to be a major player in this effort. Do you support this process and how can we be assured of its completion?

A. 32: EPA has statutory authority under a number of statutes to set exposure standards for the cleanup of sites contaminated with radiation and the protection of drinking water. The Atomic Energy Act, the Comprehensive Environmental Response, Compensation, and Liability Act, the Toxic Substances Control Act, and the Resource Conservation and Recovery Act each give the Agency authority, although each statute excludes some radionuclides or some radioactively contaminated sites. The Agency is currently considering which statute, or combination of statutes, can best be applied to developing cleanup regulations. The Office of Air and Radiation is taking the lead in developing radiation cleanup standards, including:

Regulatory Development Efforts

- Regulations are being developed which will set forth cleanup procedures and criteria, including residual radioactivity levels.
- Waste management regulations are also being developed and will address the disposal and recycle of radioactively contaminated waste resulting from cleanup.
- EPA is participating in the NRC's participatory rulemaking workshops for the development of their Decommissioning rulemaking. NRC can be exempted from the EPA regulation if EPA concludes that the NRC regulation provides a sufficient level of protection for the public health and environment.
- EPA is chairing a high-level Interagency Steering Committee to address coordination of effort in the cleanup of radioactively contaminated sites. This committee was proposed by the Office of Management and Budget to address this multi-agency issue. In addition to EPA, the committee consists of representatives from the Departments of Defense and Energy and the Nuclear Regulatory Commission (NRC).

Atomic Energy Act Federal Guidance

- EPA chairs the committee on the development of Federal Guidance governing radiation issues. Once the committee issues its guidance, all Federal Agencies must implement them.
- This committee is actively pursuing the revision of existing Federal radiation protection guidance for the general public, including technical and policy issues relevant to radiation cleanup.

I strongly support all of these initiatives. Cabinet status of the EPA would greatly improve the Agency's ability to respond to this important public health and environmental issue in a cost effective and timely manner.

Q. 33: A) Which Federal agency—EPA or the Corps—has final authority to determine whether dredging and disposal projects are “environmentally acceptable”?

A. 33: A) The determination of environmental acceptability of dredging and disposal projects is made by a number of Federal and State agencies, depending in part on the nature of the activity, in what waters it occurs, and at what point one is in the decisionmaking process.

In most cases, dredging projects involve a discharge of dredged material into waters of the United States or into ocean waters. When such a discharge is involved (including the runoff or overflow from a contained land or water disposal site), the Corps is the permitting authority,¹ and makes a determination with the input of Federal agencies, State agencies, and the general public through the Public Notice process. If EPA disagrees with the Corps, EPA retains the ultimate authority, pursuant to Section 404(c) of the Clean Water Act (CWA) for waters of the U.S., or pursuant to Section 103 of the Marine Protection Research, and Sanctuaries Act (MPRSA) for ocean waters, to determine the acceptability of environmental impacts of the discharge on certain aquatic resources.

Dredging projects that do not subsequently involve a discharge of dredged material into waters of the United States are not subject to Section 404, but are subject to Section 10 of the Rivers and Harbors Act. The Corps makes the final determination of acceptability when an activity is governed only by Section 10, subject to the paragraphs below.

Pursuant to CWA Section 401, the States provide water quality certification for federally permitted or licensed (or conducted) dredging activities under CWA Section 404 and River and Harbors Act Section 10. Both authorities are subject to CWA Section 401 review including State water quality standards adopted pursuant to CWA Section 303(c), other CWA requirements, and appropriate requirements of State law.

EPA also reviews required environmental impact documentation prepared for Corps regulatory decisions and Civil Works dredging and disposal projects, pursuant to NEPA. At present, if EPA determines that a decision is “environmentally unacceptable,” the Agency may elevate the issue to the President’s Council of Environmental Quality.

Q. 33: B) Are Federal agencies, such as the Corps, under an obligation to carry out their actions in compliance with Federal water quality standards? Is the same true for EPA-approved State water quality standards? If these two types of standards are treated differently, what is the legal authority or other justification?

A. 33: B) Federal agencies, such as the Corps, are under an obligation to carry out their actions in compliance with both types of these standards. A Federal water quality standard is promulgated when a State fails to promulgate adequate water quality standards of their own.

In the case of the CWA, Section 301(b)(1)(C) requires Corps compliance with federally promulgated water quality standards in the issuance of permits to the same extent as for EPA-approved State water quality standards.² This requirement is contained in the Corps’ regulations as well. In the case of the Marine Protection, Research, and Sanctuaries Act (MPRSA), Section 102 prohibits dumping which would violate applicable water quality standards and does not distinguish between federally promulgated or state water quality standards.

Pursuant to CWA Section 304(a), EPA issues Federal water quality criteria to be used by the States. States use this guidance and other information to adopt criteria into State law to support designated uses. The criteria and designated uses are adopted as water quality *standards* subject to EPA review and approval. The Corps obtains State Section 401 certification (or waiver) for Corps-permitted (or conducted) activities which may involve a discharge to a State’s waters. In addition, as part of demonstrating compliance with the CWA or the MPRSA, the activity regulated or conducted by the Corps is required to meet applicable State water quality standards.

Q. 33: C) Must any Corps determination of its “least costly and environmentally acceptable” Federal standard embody from the outset the minimum of environmental acceptability defined by compliance with Federal and EPA-approved State water quality standards? Please explain.

¹ Note that for Corps Civil Works navigation and maintenance projects (as opposed to regulatory review of other proposed discharges), the Corps of Engineers conducts the equivalent of the CWA Section 404(b)(1) Guidelines or MPRSA § 103 analysis to determine environmental impacts, even though they do not issue themselves a permit.

² The most recent Federal promulgation of water quality standards was for toxic pollutants in 14 States (see 57 FR 60848, December 22, 1992).

A. 33: C) Yes, the Corps' concept of "environmental acceptability" embodied in their Federal Standard includes compliance with State water quality standards. Likewise, compliance with the CWA Section 404(b)(1) Guidelines or MPRSA regulations for dumping in ocean waters, is a requirement for "environmental acceptability." Projects that do not comply with State water quality standards, or the Section 404(b)(1) Guidelines or MPRSA regulations, are not consistent with the Federal Standard.

Q. 33: D) What happens in the case such as at the Port of Toledo where an EPA-approved State water quality standard is interpreted differently by the Corps than by the State? Does EPA have a position on which entity—the Corps or the State—has the ultimate authority to interpret a State's water quality standards as they may relate to a Corps navigational dredging and disposal project?

A. 33: D) Where a State has an EPA-approved water quality standard, the State has the authority to "interpret" that standard. In the case of the Port of Toledo, the disagreement between the Corps and the State (and EPA which supports the State) concerns the "validity" of a narrative standard. Narrative standards are valid and authorized in 40 CFR 131.11. Therefore, Section 401 certifications relying on narrative water quality standards are valid.³

Q. 33: E) What, if any, recourse does the Corps have if it considers an EPA-approved State water quality standard—that may constrain its dredging and disposal options—excessive?

A. 33: E) As previously discussed, the Corps must comply with State water quality standards, regardless of whether or not the Corps considers them "excessive." If a State requests conditions addressing chemical, physical, or biological water quality concerns, on a Federal project that would result in the Corps carrying out the project in excess of their Federal Standard (i.e., conducting a project that costs more than another environmentally acceptable alternative), the Corps would not honor the State's request, because they would believe it violates their regulations. There are several courses a project could take if the Corps and a State disagree: (1) a local sponsor could pay the increased costs associated with a project, to carry out that alternative; (2) the Corps could pay certain additional costs with other funds, if these are available; (3) the Corps could modify their calculation of the least cost, environmentally acceptable alternative to incorporate compliance with State water quality standards as interpreted by the State; or (4) Congress could appropriate additional funds to conduct the project in a specific manner.

If the Corps cannot comply with conditions requested by the State, there are several additional courses a project could take: (1) the Corps could refuse to conduct the project; (2) the State could waive its certification (or grant a variance under State procedures) for the project to allow it to proceed; or (3) in the case of the CWA 404 regulated activities, the Corps could invoke authority under CWA Section 404(t) to maintain navigation, in spite of State requirements (to our knowledge, this authority—which we regard as emergency—has never been exercised).

Q. 33: F) Are EPA-approved State water quality standards somehow different from Federal water quality standards such that Federal agencies can selectively refuse to pay specific costs associated with EPA-approved State water quality standards?

A. 33: F) No. (see response to Question B which discusses the difference between EPA-approved State water quality standards and Federally promulgated water quality standards) Federal agencies cannot selectively refuse to comply with portions of a standard due to cost, but must comply with the entire standard, whether State or federally promulgated.

Q. 34: What thoughts do you have on the Great Lakes Sediment Control Act of 1993?

A. 34: In general, EPA supports the goals and objectives of the Great Lakes Sediment Control Act (GLSCA). Many of the activities mandated by the proposed GLSCA are already underway in response to mandates of the National Environmental Policy Act (NEPA) and Section 404 of the Federal Water Pollution Control Act (FWPCA), and through less formal mechanisms. As such, the GLSCA complements the direction and goals of our Great Lakes programs. However, the Agency is concerned that the mandates of the GLSCA will require extensive resources which the Act does not provide, and will in many cases, require timeframes beyond those spec-

³ We understand that the Corps believes that they are complying with all of the State of Ohio's standards and that the State of Ohio does not have a valid standard in place concerning the goal of eliminating all open-water disposal of dredged material. This goal is part of the State of Ohio's Phosphorus Reduction Strategy, which is contained in the narrative portion of the water quality standards.

ified. In particular, those mandates concerning the development of sediment disposal guidance and the management of confined disposal facilities on the Great Lakes cannot realistically be completed by the December 31, 1994, deadline imposed by the GLSCA. In addition, while we consider existing confined disposal facilities to be worthy of the type of attention outlined in the bill, we also believe that they pose much less of a risk to the environment than the large amount of unconfined contaminated sediments that are currently in place in the Great Lakes system. If the impact of the bill is to divert limited resources from in place contaminated sediment remediation to confined disposal facility certification, the Great Lakes environment will suffer.

EPA is not opposed to concurrence authority on matters of sediment management, but wishes to note that the Corps of Engineers currently seeks EPA input and concurrence on most such matters in the Great Lakes. In addition, the imposition of EPA concurrence authority for sediment management matters in the Great Lakes Basin, but not for such matters in other waters of the United States, may lead to significant variations in the government's response to such matters.

We wish to note one area of potential confusion in the GLSCA. Subsection 2(A) of Section (n) Sediment Load Reduction, implies that the Administrator of EPA shall award grants to achieve such reductions under authority of Section 319 of the FWPCA. However, Subsection 4(A) of Section (n) implies that the Secretary of the Army will award such grants with EPA concurrence. Only EPA is authorized to award Section 319 grants.

Q. 35: What are your views on the Great Lakes Federal Effectiveness Act which would create a Great Lakes Research Council to coordinate research among Federal agencies?

A. 35: Research into the ecological processes of the Great Lakes is critical to both our understanding of the Great Lakes and to our efforts to protect and restore these unique resources. However, EPA does not believe that the establishment of an additional committee under the auspices of the International Joint Commission will ensure the promotion of an ecosystem approach among the responsible Federal agencies. Rather, the Agency believes such a committee to be unnecessary. Scarce public resources can be better spent through directed research programs supporting ongoing U.S. regulatory efforts.

Q. 36: A) How would you organize and what priority would you give to geographically-targeted programs?

A. 36: A) Over the years, EPA has focused its efforts on technology-based control programs. While EPA has achieved a high level of success in controlling pollutants to waterbodies through this traditional technology-based approach, it has become apparent that other risks to ecosystems and human health exist which may be better addressed through geographically targeted efforts. Geographically-targeted programs, such as EPA's Great Water Body programs in the Great Lakes, Chesapeake Bay and the Gulf of Mexico; the National Estuary program; and smaller scale Clean Lakes; Near Coastal Waters, and other watershed projects have been very successful at refocusing attention on water resources in need of protection or restoration and tailoring solutions to these remaining needs. Often the larger-scale efforts have involved several Regions and States, requiring a cooperative team effort to their management. Experience-to-date suggests that these efforts, as well as ground water protection, should be managed from the "most local level" embracing an ecosystem protection approach, i.e., the Regions if Regional in scope, or State if intrastate. Experience has also taught us that there must be a clear lead or chairperson and staff support for these efforts. Based on our success with geographically-targeted efforts and our need to move to a more holistic approach to ecosystem protection to resolve our remaining problems, we are also promoting a Watershed Approach on a much broader-scale across the Nation as part of our ecosystem protection approach.

Q. 36: B) What role would you give to ecosystem research?

A. 36: B) Ecosystem research is a high priority. Watershed management and geographically-targeted programs are two very important approaches to achieving long-term protection of our nation's ecological resources. They incorporate the multimedia and biological system considerations that are essential in order to restore damaged resources and minimize future degradation. Research is critical for EPA's agency-wide ecosystems management initiatives and continuing efforts to develop biological criteria, new bioassessment protocols, and environmental indicators, which will significantly enhance the agency's ability to measure conditions of ecological resources and to make progress in meeting specific environmental goals. Other ecosystem research efforts currently underway include: ecotoxicology (which examines the

effects of toxicants on both plants and animals); ecological restoration; ecological risk assessment and management; and environmental monitoring.

Q. 36: C) Would it be possible to better coordinate the work of other natural resource agencies, such as the Fish and Wildlife Service, NOAA, and the Army Corps of Engineers?

A. 36: C) Yes, it is possible to have better interagency coordination. This should be accomplished through all levels of communications and cooperation. We are doing several things to promote this. High-level management meetings involving these and other Federal agencies on an ongoing basis are helping to improve coordination and consistency and particularly helpful in resolving environmental disputes which cross jurisdictional lines. For instance, I now meet personally on a monthly basis with the Secretary of the Department of the Interior, the Department of Agriculture, and the Department of Energy, to foster this type of collaboration, and our respective staff meet weekly.

Interagency cooperation/collaboration can be further expanded in efforts such as joint regulatory responsibilities, mutual science and research projects, information management systems and data sharing, monitoring and assessment strategies, and other opportunities. EPA participates in interagency efforts for ecological protection in leadership capacities, as equal partners, or simply in a supportive role. Interagency partnerships are also well suited for implementation at the regional office level, and are occurring in all EPA regions.

Memoranda of Understanding (MOUs), like the one signed between my predecessor William Reilly and John Turner of the Fish and Wildlife Service, and long-term personnel exchange programs involving relevant agencies also enhance agency cooperation and should be pursued. Other programs like EPA's Environmental Monitoring and Assessment Program (EMAP) maintains more than 20 MOU's and Interagency Agreements (IAGs) with 12 Federal Agencies. Additionally, conferences like Watershed '93, which was sponsored by EPA and 13 other Federal agencies, will improve coordination. Other examples include the National Estuary Program, which involves interagency coordination to address priority problems in our Nation's estuaries. In the dredge material management programs, the EPA and Army Corps of Engineers are working closely together on several technical guidances and a strategy to address management of dioxin-contaminated dredged materials.

Q. 37: A recent National Law Journal study, released on September 21, 1992, reported that superfund cleanup activity began from 12 percent to 42 percent later at minority sites for over half of the ten autonomous regions. How does Region 5 compare with those statistics and what other comments do you have on this matter?

A. 37: The National Law Journal (NLJ) reported that in six of EPA's ten regions, the pace of EPA action from discovery of the site to the beginning of cleanup is from eight percent to 42 percent faster at white sites than at minority sites. The NLJ found that in one EPA region, the pace of cleanup for minority and white sites was even, and that in three Regions, the cleanup began more quickly at minority sites. For Region 5, the NLJ found the pace of cleanup from discovery to cleanup was 13.8 years for minority sites compared to 9.7 years for white sites (42 percent longer at minority sites.)

There are several methodological flaws in the NLJ's work that call into question these results. For example, the NLJ relied on the ZIP codes as a surrogate for location to determine the demographics around a site. In some cases, ZIP codes represent a mailing address but not the actual location of a site. Another example is the use by the NLJ of discovery dates that were well before the Superfund law was passed and therefore before Superfund action was possible. Also, the NLJ did not look at other site variables that affect cleanup decisions such as type of site.

It is important to note that these flaws in the NLJ analysis do not completely explain why the NLJ found cleanup activities take longer at minority sites in some regions. The NLJ has raised an important issue that needs to be examined carefully. For this reason, EPA is making a serious commitment to determine whether racial inequities exist in the Superfund program. We are using the most current and reliable data available to study the demography around Superfund sites, and comparing these data with the historic performance of the Superfund program. By this summer, we plan to link minority status with site variables such as time from discovery to first removal activity, and type of remedy selected to determine whether there are biases in the program.

In addition, the Agency is taking a proactive approach to equity by providing site decision makers with demographic information early in the site identification process. We believe that getting this information out early will provide opportunities for EPA to improve communication with members of minority communities.

Q. 38: What environmental equity strategies are being developed for the Great Lakes region by the Office of Environmental Equity?

A. 38: The Office of Environmental Equity is particularly concerned with the health effects on minority and low-income human populations resulting from the consumption of contaminated fish. In particular, American Indians, African Americans, and Asian Americans are believed to be at risk due to their high subsistence and cultural fish consumption rates. In addition, fetuses and nursing infants of mothers who consume contaminated Great Lakes fish are believed to be at risk. The Office of Environmental Equity is addressing equity concerns by coordinating with the Agency for Toxic Substances and Disease Registry's (ATSDR) Great Lakes Human Health Effects Research Program. The goal of this program is to:

- 1) Identify human populations residing in the Great Lakes Basin who may be at significantly increased risk of adverse health effects due to higher consumption rates of fish contaminated with pollutants from the Great Lakes and to prevent unreasonable risk of health effects. The Office of Environmental Equity is coordinating its involvement with EPA's Office of Water, Region 5 offices, and the Great Lakes National Program Office.
- 2) Enhance training and awareness of Federal, Tribal, State and local officials dealing with minority and low-income populations believed to be at significantly increased risk of adverse health effects due to their high subsistence fish consumption rates;
- 3) Support the collection of demographic and research data which identifies the populations at significantly increased risk and documents the risk and severity of different adverse health effects;
- 4) Encourage the dissemination of outreach materials, public notices and public hearings in multiple languages, as appropriate, to make information more accessible to non-English speaking populations living in the Great Lakes Region;
- 5) Review and monitor all reports from the Great Lakes Program involving evidence of potentially increased health risks to special populations;
- 6) Provide consultation to the Great Lakes staff on equity matters.

Q. 39: Under Superfund, how are submerged sites treated in the hazard ranking system? How many submerged sites are currently on the National Priority List?

A. 39: The evaluation of sediment contamination at Superfund sites is an area that has received increasing attention as public concerns, health impacts, costs, and challenges of remediation have evolved. The original Hazard Ranking System (HRS) [the primary tool used to support the placement of sites on to the NPL] did not explicitly evaluate contaminated sediments. However, surface water contamination was evaluated and sites with contaminated sediments could be scored under the surface water pathway. In revising the HRS, the EPA has made the evaluation of contaminated sediments more explicit in the following ways:

- Sediments are evaluated to determine if contaminant levels are above background. If concentrations exceed background levels, additional points are assigned in the site scoring.
- Sites that show contamination levels above background levels are also evaluated to determine if concentrations exceed levels that exceed risk/regulation based cleanup goals. These goals include cancer and non-cancer risks.
- Chemicals that have a tendency to bioaccumulate receive additional points within the HRS scoring process.

The first two bullets reflect evaluation processes that are consistent with the evaluations that are performed for all pathways in HRS scoring. The consideration of bioaccumulation is also provided for the surface water pathway evaluations as they evaluate water contamination. Thus, the revised HRS provides explicit consideration for the evaluation of contaminated sediments. The evaluation of contaminated surface water is an area that has received considerable attention during the revisions to the HRS. Results from the scoring of field test sites indicate that the current HRS should provide slightly more points to sites with surface water contamination than did the original HRS. The pathway is divided into the Drinking Water, Food Chain, and Environmental threats. Thus between the changes to the HRS in the area of surface water and contaminated sediments, sites with either surface water contamination or contaminated sediments should receive higher scores.

Over 90 percent of the sites scored with the original HRS are adjacent to surface water bodies. Less than half of the sites scored with the revised HRS were identified through the scoring of sites. It is reasonable to expect that scoring for the surface water pathway would lead to an underestimate of sites near surface water because pathways are not likely to be scored unless data is available and scoring is expected to lead to a noticeable contribution to the overall site score.

There are also a group of sites that have been associated with radioactive waste in the ocean. Several of these sites have received repeated attention. These sites include the Farallon Islands, which is over a 100 miles off the California coast from San Francisco, and several sites off the East Coast.

Q. 40: Last year, I introduced legislation (S.3336) to establish a pilot program for the government to acquire and demonstrate the use of products made from recovered materials in the construction and retrofitting of Federal buildings. What thoughts do you have on how to best make this a successful pilot program? Will you work with the Committee to help craft and implement this proposal?

A. 40: EPA believes that its current Design and Construction Program serves as a model for acquiring and demonstrating the use of products made from recovered materials. All newly constructed EPA facilities not only require use of recycled products through Agency procurement policy, but also utilize other pollution prevention initiatives, such as water conservation, and energy conservation features utilizing a "green lights" approach.

EPA would be delighted to work with the Committee to help craft and implement this proposal.

Q. 41: Ms. Browner, in October, 1992, GAO reported to this Committee on the status of efforts to protect workers from asbestos hazards. Some of its conclusions included the fact that no single agency is responsible for maintaining information on asbestos materials in buildings, no agency surveyed was fully implementing either the EPA's recommendations for managing asbestos or OSHA's requirements for protecting against potentially harmful exposure, and only two of the agencies visited have issued guidance to worksite managers informing them of what actions to take to manage asbestos. Would you comment on the status of EPA's efforts to improve this situation and what you will do to help ensure that workers are adequately protected against potentially harmful exposure?

A. 41: EPA continues its strong support of programs helping to ensure that workers are adequately protected against potentially harmful exposure to asbestos fibers. Some of that support is in the form of guidance documents and recommendations; other support comes through regulation. EPA staff meet regularly with other Federal agencies at meetings such as the Federal Asbestos Task Force (FATF) and the Asbestos Design and Development Initiatives Group (ADDIG). New EPA regulations and guidance materials are discussed.

1. OSHA has primary responsibility for regulations applicable to employee exposure in the workplace. However, because OSHA lacks jurisdiction over workers in the public sector, under the *EPA Asbestos Worker Protection Rule (WPR)*, EPA extends coverage comparable to that of the OSHA asbestos standards to State and local government (public sector) workers in 27 states. (Twenty-three states and jurisdictions operating OSHA-approved state plans cover both public and private sector workers and two states cover public employees only.)

The current (1987) EPA WPR provides worker protection coverage only for asbestos abatement projects. A revision of the WPR, now undergoing Agency review, will extend all of the coverage provided under the OSHA Asbestos Standard for the Construction Industry to all public sector workers in the 27 states covered by the EPA WPR. Protection will be provided for all "construction work activities," including building operations and maintenance, repair, renovation, demolition, and removal work, where asbestos is encountered in the workplace.

Also, EPA's revised *Model Accreditation Plan (MAP)* will extend training and accreditation requirements to workers and others who are not now required to have extended training.

2. EPA provided financial support and staff oversight to the National Institute of Building Sciences (NIBS) in their development and publication (September 1992) of a new guidance manual. The NIBS *Asbestos Operations & Maintenance (O&M) Work Practices* manual is a practical supplement to the Agency's 1990 guidance manual, "Managing Asbestos in Place" (the Green Book). With the guidance provided to building asbestos program managers and workers, and with the detailed, specific, and appropriate work practices for asbestos O&M workers that are set forth in the new manual, EPA believes this represents another major step forward in worker protection.

3. EPA has increased its communication with OSHA to help coordinate issues of mutual concern to both agencies as OSHA works to revise their asbestos worker protection regulations. We anticipate publication of OSHA's revised standards sometime this summer.

Q. 42: I'm interested in your thoughts on how the EPA can better address environmental problems on Indian reservations. Would you agree that a major prob-

lem is that more resources need to be targeted for enforcement and technical assistance on reservations?

What percentage of the EPA's funding and staff are targeted on Indian Tribes?

A. 42: EPA currently provides resources for environmental protection on Indian lands in three ways. First, it provides resources through Congressional appropriations and set-asides such as those provided under Section 319 and Title VI of the Clean Water Act (CWA) and funds appropriated in support of the multimedia/general assistance program. Second, EPA provides resources through regulatory set-asides such as the up to 3 percent of CWA Section 106 funds that are set-aside under that Act's Indian Program regulations. Finally, individual EPA offices review their grant funds on a yearly basis and include tribes along with states within their discretionary programs.

Currently, 100 percent of EPA's multi-media/general assistance funds go to tribes. Other program funding directed to tribes include: about 2-3 percent of the funds for state, local and tribal programs, about 0.9 percent of the Agency's Superfund monies, and 0.5 percent of the wastewater treatment construction funds are reserved for tribes. Approximately 0.7 percent of EPA's work effort is devoted to the Indian Program. EPA has increased its support of tribal programs by over 600 percent since the adoption of its Indian Policy. As tribes continue to develop their capacity to participate in EPA programs, the Agency will need to continue to increase its efforts to support the development of tribal regulatory systems.

Q. 43: In light of the magnitude of environmental problems in Indian country, would you have a recommendation for an appropriate policy position to address them if the EPA becomes a Department?

A. 43: In 1984, EPA was the first Federal agency outside of the Bureau of Indian Affairs and the Indian Health Service to adopt an Indian Policy. The Agency's policy recognizes the sovereignty of tribal governments and its trust responsibility to tribes and commits EPA to working with tribal governments on a government-to-government basis. If EPA becomes a department, these basic foundations of the Agency's Indian Policy will be the cornerstones of any Departmental approach which the Agency will take in the conduct of its affairs with Indian nations.

Q. 44: Do you feel that Natives Americans deserve a voice and a strong advocate at the policy-making level of a new "Department of the Environment?"

A. 44: For the past several years EPA has had individuals in the role of Special Assistant to the Administrator who have advocated the inclusion of Indian tribes in all appropriate areas of the Agency's programs. If the Agency is elevated to Departmental status, this advocacy role will, along with other appropriate program areas, be reviewed to determine how it can best be institutionalized within the framework of the new Department. To facilitate the process of ensuring an Indian voice as the Agency implements its Indian Policy, and in support of the President's policy of having government reflect the essential character of the American people, the Agency will increase its efforts to recruit qualified tribal members to occupy positions at all levels within the Agency, including those that develop policy at its highest levels.

Q. 45: Isn't it both reasonable and necessary to have one of the ten Assistant Secretaries called for by this bill to be responsible solely for environmental policies and programs affecting Indian tribes and lands?

A. 45: The EPA Indian Program is an important function that cuts across all of the Agency's major programs to help protect human health and the environment. If the Agency is elevated to Department status, it will review its current structure and the legislative mandates of both its program-specific and cross-cutting functions to determine how to most effectively employ its human and financial resources to meet its statutory obligations.

Q. 46: The issue of what the economic costs and impacts of environmental regulations on the public and businesses is being increasingly debated. Can you inform us how you will act to see that these concerns are properly evaluated by senior policy makers at a new Department of the Environment? Is this an issue of great importance to you?

A. 46: The issue is indeed of great importance to me and EPA. Since the passage of the Clean Air and Water Acts in the early 1970's, EPA has issued periodic reports on the economic costs of air and water pollution control expenditures. The most recent of these reports, entitled *Environmental Investments: The Cost of a Clean Environment*, was issued in late 1990, and updates are planned for future years. This report summarizes the pollution control costs in all media for which EPA has responsibility for both the public and private sectors. Since the 1970s, EPA has also prepared comprehensive economic cost and impact studies on each major regulation, as have most other Federal regulatory agencies. These reports are used

by the Agency and other Federal agencies in evaluating most major proposed regulations before they are issued.

These efforts will be intensified under the new proposed Department of the Environment so as to assure that the costs and impacts of new proposed regulations are given the attention they deserve both before and after regulations are issued. I also plan to insist that these reports, once prepared, be given careful attention by senior Departmental policy makers to the extent allowed by law.

Although environmental pollution control regulations cannot be made cost-free, I can and will insist that the costs be held to the lowest levels consistent with the laws under which we operate and the protection of the environment. By preparing and using these reports at both the regulation level and the program level, I believe that the environment can be improved while not increasing the costs of environmental protection beyond the capability of our economy to pay them.

Q. 47: One area I believe you will need to watch very carefully is the environmental problems that exist at military bases in the U.S. that will be converted for civilian purposes. Do you have a plan to work with the Department of Defense to address environmental problems for the large number of military bases that will be closed in the next four years?

A. 47: Yes, EPA has a plan to work with DOD to address environmental problems at closing military bases. The plan is to: 1) define the Agency's mission relative to base closure; 2) define and build the type of organization/infrastructure to carry out the Agency's mission; and 3) address environmental issues associated with base closure. This response focuses on the mission and some of the steps taken to address the many issues associated with base closure.

The mission of EPA's base closure program was defined in 1991: to protect human health and the environment and return closing bases to safe and productive use as soon as possible. Fundamentally, most of the issues associated with accomplishing the mission can be distilled into two overriding interrelated problems: expediting property transfer and accelerating site cleanup. The following are only several of many actions that have been taken to address these issues:

EPA and DOD co-sponsored a series of conferences entitled, "Military Base Closure: Accelerating Environmental Restoration." The conferences served as forums for improving communication between DOD, EPA, states, local communities, and other interested parties to facilitate cleanup and redevelopment of closing bases and help resolve issues affecting the base closure process. Conference participants met to discuss acceleration initiatives, risk management, real estate and redevelopment, remediation technologies, and the development of standardized techniques relative to hazardous waste cleanups at closing military bases. The team approach, i.e., the close working relationship among the regulators and the installation project manager, was stressed throughout the conferences. The conferences demonstrated that by investing in a team approach, EPA, DOD, and the states can streamline and accelerate cleanup at closing bases.

EPA is working closely with DOD to develop procedures for identifying uncontaminated parcels at closing bases so that the parcels can be made available for reuse as quickly as possible. EPA is also working with DOD to establish procedures for the transfer of remediated parcels and leasing of contaminated parcels.

Finally, pursuant to the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, EPA reviews NEPA documents and provides comments to the Armed Service branches regarding the environmental affects associated with proposed base reuse and disposal.

Q. 48: President Clinton has promised a reduction of 100,000 jobs and a 14 percent cut in Administrative costs of Federal Departments and agencies. Can you comment on how you will achieve these reductions without compromising the integrity of environmental protection programs?

A. 48: The Clinton Administration's deficit reduction strategy is a long-term plan which will be implemented over a five year period, from fiscal year 1993-1998. In the short-term, EPA has taken its share of reductions equally across the board. In fiscal year 1994, EPA has limited spending in some areas, while focusing valuable resources toward critical environmental programs. Through these efforts, EPA will be able to attain the savings necessary for sound economic growth while securing a safe and healthy environment for future generations. In addition, EPA is currently in the early stages of planning a base program review of EPA activities. This review will help us compare resource expenditures with national environmental priorities, as a basis for future budgeting efforts.

BOSTON PUBLIC LIBRARY

3 9999 05982 875 4

ISBN 0-16-041373-7

90000

9 780160 413735